APRIL 1941 VOL. 13 NO. 4

# FOOD INDUSTRIES

M. A. WILLIAMSON
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## ★HOMES OF FAMOUS FOODS

On the cover this month is the Crockett, Calif., refinery of California and Hawaiian Sugar Refining Corp., Ltd. The plant is well situated, being located on Karquines Strait between San Pablo Bay and Suisun Bay, the former being an arm of San Francisco Bay. It is also on a railroad.

McGraw-Hill Publishing Company, Inc., James H. McGraw, Founder and Honorary Chairman. Publication Office: 99-129 North Broadway, Albany, N. Y., Editorial and Executive Offices: 330 West 42nd Street, New York. Branch Offices: 520 North Michigan Ave., Chicago; 68 Post St., San Francisco; Aldwych House, Aldwych, London, W.C. 2; Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Atlanta, Ga. James H. McGraw, Jr., President; Howard Ehrlich, Executive Vice-President; Mason Britton, Vice-Chairman; B. R. Putnam, Treasurer; D. C. McGraw, Secretary; J. E. Blackburn, Jr., Director of Circulation.

Published monthly; price 35c a copy. Allow at least ten days for a change of address. All communications about subscriptions should be addressed to the Director of Circulation, 330 West 42nd Street, New York, N. Y. Subscription rates: United States and possessions, Mexico, Central and South American countries, $3 a year, $4 for two years, $5 for three years. Canada, $3.50 a year; $5 for two years; $6 for three years (payable in Canadian or U. S. funds). Great Britain and British possessions, 30 shillings for one year, 60 shillings for three years. All other countries, $5 a year, $10 for three years. Entered as second-class matter Aug. 17, 1936, at Post Office, Albany, N. Y., under the act of March 3, 1879. Cable address: "McGrawhill, N. Y." Member of A.B.P. Member of A.B.C. Contents indexed monthly in the Industrial Arts Index. Copyright, 1941, by McGraw-Hill Publishing Company, Inc.

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# This Issue

## NOTHING FISHY ABOUT IT

When there is little odor to the bilge water in a fishing boat that has been out 11 days you have a phenomenon. And such a phenomenon has been produced in the fishing industry of the Northwest by icing the fish on the boats with "antiseptic" ice. But the value of this bacteria-killing refrigerant lies not in deodorizing bilge water but in keeping the catch in high-quality condition. Page 43.

## SAVES $1,781 PER TRUCK YEAR

Little definite information on the performance of diesel trucks in the food industries has heretofore been available. Now we correct that situation with the article on page 44. This article tells how a brewing company cut truck fuel costs by more than 60 percent, saving $1,781 per truck per year.

## HOT GALLONS AND COLD GALLONS

If your jallopy will go 170 miles on 10 gal. of cold gasoline, it will run only 165½ miles on that much warm gas. There's more fuel in a gallon of cold gasoline. All of which leads up to the article, "How to Measure Bulk Quantities of Liquids," page 41. Temperature, distortion of container, effect of separated solids, froth and suspended bubbles are factors affecting the measurement. Neal M. Carter, Pacific Fisheries Experimental Station, Prince Rupert, B. C., tells all about it.

## STOCK-PILE IMPORTED OILS?

With ocean transportation becoming scarcer, some are beginning to say that the U. S. should build "stock piles" of imported fats and oils. Domestic food-oil producers view this suggestion with some dismay, feeling that the presence of a stored supply would have an adverse effect on their market. However, it is entirely possible to have such a stock pile for the benefit of soap makers without affecting edible-oil processors. How this might be done is told on page 46 by Gordon W. McBride.

## SPEED-UP FOR QUALITY

Speed in processing operations is the key to high quality in both the freezing and canning of many fruits and vegetables. Where peel must be removed from the raw product before enzymes are inactivated by blanching, freezing or other means, protection of both flavor and appearance makes speedy processing doubly important.

Working with peaches, Irvin T. Olsen of the University of Tennessee has found that chemical peeling can be greatly speeded by adding a wetting agent to the alkaline peeling solution. This same method will likely speed up other peeling operations. How it's done is told on page 51.

# Coming

## LOWDOWN ON U.S. GRADING

Federal inspection and grading in canning plants has reached that stage where the food manufacturers must evaluate its significance. So one of FOOD INDUSTRIES' editors has visited AMS inspected plants from up-state New York to Florida, has talked with the plant managers and has lined-up material for a series of articles which will cover the various phases of this timely subject exhaustively.

To be published as a special section in an early issue, this material will include articles by canners using the AMS service, giving their views as to its requirements, value and cost, and describing their experiences with it. The special section will also give the consolidated opinions of 35 Florida citrus fruit canners who are not using the AMS service but sell their products in competition with canners that are.

## LEARN ABOUT JAMS FROM BRITISH

More than 50 kinds of jams are manufactured and 21 varieties of fruits are used by British manufacturers. And the old-fashioned methods of making jams, jellies and marmalades are fast being replaced in Britain with more efficient, better engineered, "semi-automatic" methods. This is saving greatly in labor and costs and is giving a better and more uniform quality. How the British make jams, and their improved processes, will be described in detail in an early issue. The author is none other than Dr. H. B. Cronshaw, British authority on food processing and editor of British food publications.

## BETTER BABY YOUR BOILER

Hard water, untreated, reduces boiler efficiency, wastes fuel, makes steam cost more, clogs up pipes and apparatus with scale and increases maintenance costs. Food plants located in hard-water regions can profit from treating water supplies. What to do about this will be told in a forthcoming issue by Robert A. Clark of Acme Breweries, who speaks from knowledge tempered by experience.

## WHAT'S A CHEMIST GOOD FOR?

Perhaps you have asked yourself that question. If your plant is small, or even medium sized, you may have been able to run along pretty satisfactorily without any routine laboratory control. And as for research—well, you may say, that's for the big fellow.

But even the relatively small plant can profit from the services of a food chemist—if the chemist and the plant manager approach their problems in the right way. What one inexperienced chemist did in a plant that had never employed a chemist before—through cooperation of chemist and management—will be told by the chemist himself.

FOOD INDUSTRIES

Established 1928 — McGraw-Hill Publishing Company, Inc.

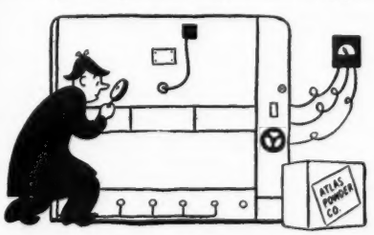
LAURENCE V. BURTON, Editor

Volume 13, Number 4 April 1941

# The Talk of the Industry

★ YOU HAVE TO BE CAREFUL these days about how you mind your own business, or some one may report you to the Federal Bureau of Investigation, just as they reported that W. E. Broeg of Parker-Broeg, Boston food consultants, was up to something that deserved official investigation.

It appears that the curiosity of certain passers-by was aroused by his complicated electrical apparatus involving the use of many thermocouples and potentiometers and a mass of wires in a study of heat transfer in baking operations. Because he was evasive when they inquired about this consulting job, and because he had in plain view several containers of sorbitol and a sorbitol derivative bearing the label of Atlas Powder Co. as manufacturer, some uninformed person concluded that he was either working with a short-wave apparatus for illicit communications or was building an infernal machine. The result was a visit from a representative of the FBI, and Bill had to make a special run to satisfy official curiosity.




It all goes to show that the world doesn't care a hoot about what you are doing as long as you don't try to keep it a secret.

★ FREEZING of fresh roasted coffee is likely to be one of the unexpected new uses of refrigeration. Immediately after the coffee is roasted, it is chilled to −10 deg. F., compressed into small blocks sufficient for two cups and wrapped in transparent material, 20 units to the pound. By keeping the compressed coffee at −10 deg. F., the combination of compression at 4,500 lb. per square inch and low temperature keeps it "fresh" indefinitely, and when placed on the retail shelf it "thaws" out but has the same shelf life as any freshly roasted coffee.

Though not yet available commercially, it appears to have considerable theoretical merit, and apparently does not in any way injure the flavor of the coffee. If its theoretical promise should materialize it may have an important effect on the distribution and merchandising of coffee.

★ "OURS is an ancient and honorable calling," says James F. Bell, president of General Mills, "and one that for at least 3,000 years has given to the human race the most necessary of foods . . . But at the same time . . . we could be a little more honorable if we were a little less ancient."

It is gratifying indeed that at least one leader in one branch of the food industry understands the problems that go along with an ancient heritage of tradition.

★ SPINACH ACREAGE in California is to be enlarged from 9,540 acres in 1940 to 12,480 in 1941, says *Pacific Rural Press*, explaining that the increase is apparently based on the impending shortage of spinach seed, 90 percent of which is normally imported from Holland. This 31 percent increase, it is stated, is for canning purposes.

Well—figure it out for yourself; we can't.

★ THE RESEARCH DEPARTMENT of one food company is soon to have one of the new electron microscopes made by RCA Manufacturing Co. This new 'scope stands higher than a man and magnifies up to about 100,000 diameters. Which is quite a bit more powerful than the usual 960 diameters of most laboratory microscopes equipped with oil immersion lenses. It is said that it takes a good man several months to become proficient in using it.

Some day, before very long we hope, the boys at the research laboratory will tell us what the inside of a bacterial cell really looks like.

★ So the United States is to have a Food Management Administration after all. So said the unofficial advance dope on March 20.

★ IT IS TO BE HOPED that the food manufacturer of today can preserve his sense of humor if he is given to studying the economic theories now originating in Washington.

One theory, of which Leon Henderson is the principal supporter, is that to prevent inflation as an aftermath of the vast current expenditures for national defense, the nation must tax the population to such an extent that the consumer can make no savings at all. Back of this idea is the concept that if you

have nothing left to spend after the tax collector takes you to the cleaners, then you can't spend it. For, unless there is spending, prices cannot rise. And without price rises, there is no inflation.

The other theory is one held by Harriett Elliott and her associates, who are lying awake nights devising ways to protect the consumer. While she supports many plans that are devised to benefit the consumer, the one which interests one most is her oft repeated plea that the food manufacturer must keep his prices down. In fact, he must not give way to upping the price of anything, even by a trifle.

If Leon Henderson should have his own way, it would appear that Miss Elliott's department will have very little to do, for if people have no money to spend they won't be able to bid up the prices for foods.

## *Aid to Embattled Democracy*

NOW THAT the voluminous discussion of the Lease-lend Bill has closed and it has become law by a vote so large that it serves notice of our national unity of purpose to the dictators, we have definitely embarked on a program of saving our own way of life—a step that some of the wisest of our citizens foresaw to be necessary as long ago as October, 1939.

If by the donation of billions in armament and by arming ourselves to the teeth we have guaranteed the continued existence of democracy in the world and the freedom of the individual which so characterizes the American way of life, then the expenditure of these vast sums will be a good investment. For, by it, we are insuring our basic right to life; liberty and the pursuit of happiness.

Let no man be so blind to sordid facts that he can claim that the fate of civilization abroad is no concern of ours. Warfare abroad is ever widening in its scope and extent, and no man can escape it by running away. The time has come when the cost we might have to pay in the future, as a penalty for doing nothing today to preserve our cherished form of life, would so far outweigh the immediate cost in blood and sweat and tears that we must act at once and with tremendous vigor.

Few indeed are the minds in America which can encompass the concept of what Hitler stands for, or what his campaign of subjugation and slavery is intended to do. The dollar cost of ridding the world of this menace is as nothing compared to the cost of postponing the day when we shall inevitably have to come to grips with his ambition of conquering the whole world.

The years to come will be the most important of any in the history of this nation. If sacrifices are needed, let us make them gladly. Let us be thankful that we are voluntarily making sacrifices rather than paying tribute.

To those few who may falter and protest, let it be said that the cost of defeat of democracy is infinitely greater than the cost of defending it. Let the doubters look at France, Norway, Denmark, Holland, Belgium—to mention only a few.

The main job from now on is to get the jump on this enemy of everything that Americans hold dear.

## *Shipping Losses Affect the Food Industry*

UNTIL merchant ship building in the United States is stepped up to greatly increased speed, the losses of cargo ships throughout the world—irrespective of the flag they fly—will become an increasing factor in the problems which face our domestic economy. In particular, the food manufacturer is vitally concerned, for many of the supplies and raw materials for the industry must be imported.

Tin and rubber are so important that the War Department defines them as strategic materials, *i.e.*, indispensable. There are, however, many other materials that may easily become scarce for no other reason than lack of ships to carry them or blockades that prevent their importation. Spices, flavoring materials, cocoa beans, coffee, many

# *Hors d'Oeuvres*

★ Perhaps you wonder why war costs so much. Here's a little light on the situation. The Navy has just spent $15,552 for coffee and sugar scoops.

★ *General Foods sells "dated fish," the date of arrival at market being stamped on the fish's tail. That's scaling piscatorial staling.*

★ Thought we'd like some of that famous Norwegian goat cheese "Gjetost," so we ordered some in a restaurant. Know what we got? Toast! But then, it's pronounced "yeh-toast."

★ *The War Department has a new gasoline field range that, installed on the front end of a truck, will prepare a hot meal while the truck is moving. With this an officer could lead his men into the jaws of hell by yelling "come and get it" and throwing her in high.*

★ With the newspaper headlines telling about the United States taking a stand against the totalitarian world, a feeling of relief is conveyed by this item from the F&DA Notices of Judgment: "U.S. vs. 9 Cubes of Butter."

★ *One of the state capitols has been modeled in cheese. How novel. The usual practice is to put the cheese into the state capitol.*

★ With the aid of a musket butt and plenty of muscle, the Civil War soldier broke hardtack into fragments and fried it in bacon fat to make what he considered a delicacy. Since 1864 civilization has progressed so far that the soldiers eat abundantly of high-quality, nutritious foods, but not so far that we don't need soldiers.

★ *Connecticut produces green-tinted oysters and Chesapeake Bay pink ones. Copper in the water causes the former; a "yeasty condition," the latter. And "yeasty conditions" in fluids have been known to cause pink elephants.*

★ Our distribution editor recently went into a cafeteria in Orlando, Fla., and ordered greens. When the girl at the steamtable drained the liquid from the greens he protested, telling her that the pot liquor was the best part. "Sorry, feller," she said, "I couldn't tell by lookin' that you was a 'cracker.'" And our editor's poise was gone with the wind.

★ *"Breakfast bread" which is "tailored for toast" is the newest creation of the bakers. We fear that Dr. Wilder has made them wild.*

★ Borden's "Elsie" has succeeded so magnificently that she is now "Elsie Enterprises," which puts her in the same class as Mickey Mouse and Donald Duck. Her name will be sold for use on toys, games and what have you. Boy, it's some promotion scheme that will sell not only your product but everybody else's products.

★ *Dr. S. W. Shear, University of California agricultural economist, believes it necessary, because of lost European markets, to further curtail production of prunes. A case of pruning the prune.*

★ "In the east north central area the minimum price per hundred pounds of milk is obtained by successively multiplying the monthly average wholesale price of 92 score butter at Chicago by 6, adding 2.4 times the monthly price of 'Twins' in the Wisconsin Cheese Exchange, dividing by 7, adding 30 percent, and multiplying by the butterfat content of the milk." Then take the first turn to your right.

F. K. L.

gums—both edible and inedible—coconut oil, palm oil, fish-liver oils, and even sucrose are but a few of the possibilities.

Add to the foregoing list the possibility that losses of world shipping may force Britain to buy more of its food from North America and less from South America or Empire possessions in order to shorten the distance of the runs. One can then visualize sudden increases in food exports from North America. Much will depend on the fortunes of war, which are unpredictable. This much is certain, however: If Germany should succeed in occupying the extreme western end of North Africa, it will mean that the traffic up and down the South Atlantic will be greatly curtailed. And Britain will be forced to procure food from North America rather than risk shipping losses or greatly extend its routes from River Plate ports around Cape Horn and through the Panama Canal.

What a baker in Bariboo, Wis., or a dairyman in Texarkana, Tex., or a canner in Minnesota can do about it is problematical—meaning that we do not know. But it is certain that the U.S. food manufacturer, be he large or small, is compelled to think in terms of world affairs. To many it will be a difficult task to look beyond the local market place, but it must be done.

Several lines of thinking are suggested:

1. Where do raw materials or supplies originate and what effect can the war have on them?

2. What substitutes are available and at what prices should the substitutions be made?

3. If substitutions must be made, what changes in processes, equipment, packaging, labeling, distribution and merchandising may be needed?

4. If supplies or certain raw materials are completely unavailable, how long would such an emergency last and to what use can the factory be put in the meantime, or what management policies should be adopted—credits, contracts, price guarantees and the like—in view of these possibilities or while such an emergency might exist?

5. If the key men who are expected to do this forward thinking should quit, die or be called into military service, will their tentative plans have been reduced to writing, or will they be lost?

The food manufacturer of the day, peaceful though his occupation may be, must adopt the same sort of thinking that characterizes the successful military strategist. He must examine all possibilities and be ready with plans to meet them should they materialize. For we are in the war though not yet fighting. To justifying mental lethargy by the familiar Biblical quotation, "Sufficient unto the day is the evil thereof," is to invite—not disaster—but needless sleepless nights, hasty ill-conceived decisions at a later date, lost markets, lost opportunities and even lost prestige or position in the market.

## *Surplus Skills Indicated By Jurisdictional Strikes*

JURISDICTIONAL STRIKES on defense projects and armament building are just grand. Keep them up.

No, we are not losing our wits. But we have been reading Section 5(c) of an Act of Congress "Public—No. 783—76th Congress" commonly referred to as the Selective Service Act. One very suggestive sentence reads:

"The President is authorized, under such rules and regulations as he may prescribe, to provide for the deferment from training and service under this Act in the land and naval forces of the United States of those men whose employment in industry . . . is found . . . to be necessary to the maintenance of the national health, safety or interest."

If that sentence means anything, it means that the President has the power to modify the existing regulations relative to occupational deferments. Section XXII, paragraph 351(b), "*'necessary man' defined,* Selective Service Regulations," reads: "He cannot be replaced satisfactorily because of a shortage of persons with his qualifications or skill in such activity."

A jurisdictional strike, by its very nature, most certainly proves that there is a surplus of persons with certain qualifications and skills. And hence that there are more available than are necessary.

Keep it up, boys, and soon you will not be eligible for Class II-A because of your "employment" on essential work connected with National Defense. And if you land in Class I-A, and thence in the Army, maybe you will wish that industry would hurry up with those tanks, guns, planes and powder.

Yes, jurisdictional strikes in defense work are great stuff. For they automatically focus attention on surplus skills and qualifications.

## *As Payrolls Grow*

AN IMPORTANT RELATION exists between the total of factory payrolls and the money which the American people will spend for food. This is clearly recognized by the defense planning groups in Washington. It was emphasized by George Livingston in his talk during Food Week in Chicago last January.

Those who attempt to make production schedules on any assumption of a *simple* relation between total payrolls and the size of their own business are, however, likely to be disappointed either pleasantly or unpleasantly. Many modifying factors enter significantly to change total income into figures for anticipated spending for any particular commodity.

So long as the government officials are able to sit on the lid of food prices, they will do so. This means that higher priced and higher quality goods may just that long be substituted in many family budgets, simply because the pay envelope is fatter. There can be a bit more buying of luxury foods by folks who could get only necessities heretofore. And there will be shifts from crude low-priced commodities to other equivalent materials more fully processed or more elaborately manufactured.

All this means that the food manufacturer has first responsibility in producing and promoting quality goods. When people have more money to spend on food, then is the time to satisfy their craving for these better products. And so long as the industry can take advantage of greater national income in that way, it will contribute much to the satisfaction of the housewife and her family.

Meantime, there is a serious responsibility also. For assisting the government to hold retail prices as near at present levels as possible is partly the food man's job. Let us hope that labor and agricultural producers of food raw materials will do their share in this job, too. All will gain from real success in this effort. Runaway food prices help no one, are likely to hurt all. Certainly they hurt food manufacturers most promptly, as they cut off all chance for sale of more or better foods which should be sold as the national income increases.

## *Priorities Hit the Food Industry*

PRIORITIES have commenced to affect the affairs of the food industry. At the moment of writing, stainless steel priorities were more of a potential problem than an actuality, yet sufficiently close to cause dairy equipment manufacturers to discuss the best way to present their case to the priorities officials.

Aluminum is, however, a problem of serious magnitude, and most users of aluminum foil have been advised that additional supplies are unobtainable for some indefinite period. The next 30 days will probably see the worst, unless strikes should aggravate the problem still further. Of course, it is conceivable that strikes in the aircraft construction industry may delay aluminum consumption to

the point that foil might be temporarily available.

Makers of aluminum foil are doing their best to convince the priorities board that the foil has two functions in packaging: Utility and decoration. While the decorative function of aluminum foil may of necessity be subordinated to defense needs, it is imperative that the utilitarian function of foil be retained in food packaging. Every user of foil for other than decorative functions must be able to set forth his needs in a very understandable and logical manner if he will be allowed to buy any.

Reynolds Metals Co. has a new plant that will be producing ingot aluminum about April first, if all goes well. This will not noticeably relieve the situation, however, for the demands of the aircraft industry are seemingly insatiable, and as new aircraft plants come into production the demand for aluminum will be still greater. Another new plant of the Aluminum Company of America on the West Coast is due to come into production within two or three months, barring strikes and other mishaps, and it is believed that when it is really under full-scale production, the priority restrictions on the use of aluminum foil will be greatly lessened. But this is a hope that is not a sound basis for management decisions. For strikes, sabotage, accidents, breakdowns, increased demand from munitions industries or arbitrary rulings by the priorities board could easily postpone the day of relief from restrictions on the use of foil.

These are the days when the food manufacturer who uses foil for utilitarian reasons will be very fortunate if he has a packaging laboratory manned by resourceful and well-informed personnel. Important and far-reaching decisions about packaging must be made as a result of the new restrictions, and a serious error of judgment based on inadequate package testing facilities might cost a great deal more than operation of a packaging laboratory for many years.

## *Institute of Food Technologists Convention*

JUNE 15, 16 and 17 are three days to be marked on your calendar. The Institute of Food Technologists will meet in Pittsburgh on those days. If you have seen a copy of the proceedings of the last meeting you can visualize the profitable character of such a convention devoted entirely to food technology.

Manufacturers who are forehanded will instruct as many of their key men as can be spared for half a week to plan to go to Pittsburgh in mid-June. Even though these men are not yet members of the IFT they are admissible to the meetings on payment of a small registration fee. The fee will not, however, entitle them to the printed proceedings.

## *Thou Shalt Not Hoard*

THE FOOD INDUSTRY needs an eleventh commandment. It can be short. It is easily understood. "Thou shalt not hoard."

And it is safe to say, also, in the language of the Good Book: "And the way of the hoarder shall be hard and his evil ways will destroy him."

No present practice of industry is more dangerous than overbuying of raw materials. It will be impractical to conceal such effort. And official censure is sure. Moreover, economic punishment is likely to be just as severe as the official discipline.

Hoarding does more damage to the hoarder's own interest than to anyone else; and it has no practical benefit. There are plenty of ways in which detected hoarding can be given this unprofitable turn. Producers of the raw material being hoarded will voluntarily, or through official guidance, cut off the hoarder altogether from his future materials supply. His hoarded stock can be taken from him, and his only recourse will be the pleasure of trying to collect from Uncle Sam in the Court of Claims. And furthermore, while he has a nice stock accumulated at slightly advanced prices, the price of material subsequently bought *by his competitors* may be pushed down below the price which he has paid for his unwarranted accumulation.

There is, however, one type of stock accumulation that should not be criticized as hoarding. That is the building up of a reserve of raw material or semi-finished goods sufficient to stabilize business. Such a practice is to be commended. Only that which is overbuying to the extent of needlessly taking limited supplies away from competitors can properly be called "hoarding."

An appeal to refrain from hoarding could be made on patriotic grounds. That might be enough. But we add the appeal of self-protection. The way of the hoarder will be rough and his destination will be economic disaster.

## *Improved Outlook for Tin*

BY AUTHORIZING the construction of a tin smelter in Texas City, Tex., the problem of our tin supply is to be partially met. Contracts for ore concentrates from the lowest grade of Bolivian tin ore indicate an ultimate production of about 18,000 tons of pig tin in the new smelter when it is actually in operation. This amount in contrast to our normal domestic needs of 75,000 tons yearly—half of which is used by food industry—is helpful in obviating some future Far Eastern problems of supply. But it must be recalled that the U.S. gets only the lowest grade ore, full of impurities that must be removed, and hence the Texas smelter is likely to be a high-cost producer even in the capable hands of the Dutch concern that is to operate it.

## *For More Deliberate Enrichment Progress*

AFTER THE March 5 conference of millers, bakers, vitamin experts and others in Chicago, it is becoming apparent that haste must be made slowly. While it is obvious that our national dietary will markedly improve with respect to vitamins and minerals, the recent episodes, precipitated by overzeal for national welfare on the part of those who do not fully understand the complexities of business, clearly indicate that progress must be made more deliberately.

Persons with no industrial experience, seeing only the relatively small cost of the enrichment materials themselves, have taken the attitude that enrichment of flour should be possible without any additions to selling prices. Overlooked are the other factors of cost such as quality control, a dual line of goods, including packages, labels, and so forth, and the educational and advertising investment that is needed to show the trade and the public how to make the most of their opportunities. And they have completely ignored the fundamental requisite of research into probable marketing methods that is necessary for launching any new enterprise.

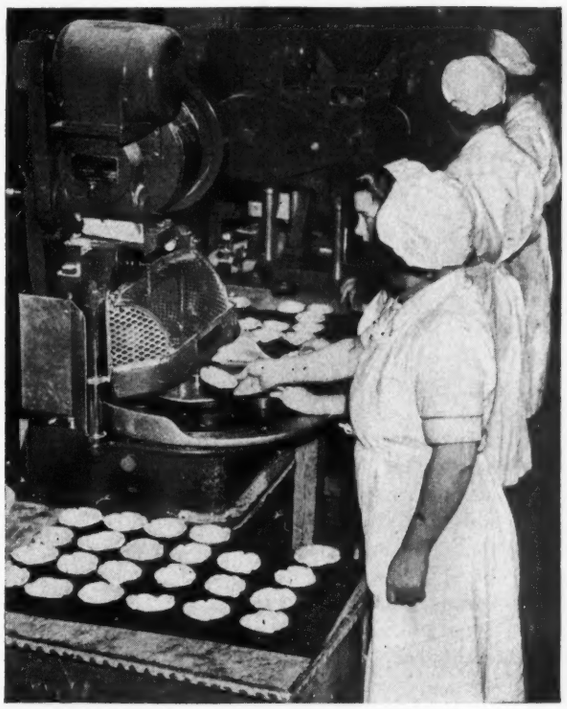
In time of stress, like the present, any manufacturer is more than willing to go along with anything that is needed for the national good. But it is unfair to blame the food industry if lack of thorough market research by the zealots failed to disclose the probable route of vitamin $B_1$ and mineral enrichments to the consumer's food. In the future let crusaders specify the objective to be attained, not the manner of attainment.

Research scientists seldom understand even the rudiments of selling or merchandising problems. Yet, to professional do-gooders, any business-man who hates red ink is anathema. Nevertheless, this is a land of free enterprise, and as long as persuasion and inducement are the motivating factors in doing business, the do-gooders must make due allowance for the time needed for development of the ways and means to persuade the buyer. Let us have no more stampedes.

# Progress in British Food Plants

**New practices in processing, packaging, lighting, handling and process control**

By ERIC HARDY,
*Liverpool, England*



**Filling meat pies by machine in a British bakery. Note safety guard.**

*British Combine*

BOTH despite the war and because of it, many changes are taking place in British food factories.

Automatic pressure sterilizing machines of the nonagitating type for handling meat products, and of the agitating type for unsweetened evaporated milk, have been supplied by a Manchester food machinery works to many firms. Your American sardine can manufacture presses are being installed over here. To preserve canned foods during long-period storage under total war conditions antiacid, sulphur-resisting and other lacquers are being used, as well as acidproof stoneware containers. Vegetable parchment, which is greaseproof, waterproof, and air- and gas-proof, is used to wrap food ranging from breakfast cereals, sausages and biscuits to powders—the great paper shortage (due to the closing of the Scandinavian pulp market and no American ships available for the North American trade) has left many shops without wrappers. Shortage of timber finds the numerous American oak containers preserved for repeated use by a lining of sterile enamel specially prepared for wood containers.

Now that the Continental milk supply has gone, the possibilities of evaporated milk are being examined, and automatic vacuum-operated machines fill unsweetened evaporated milk into 16-oz. open-top cans at the rate of 6,000 cans per hour.

Long spells of black-out conditions in those factories working at night increase the temperature, and production has been found to fall unless improved ventilation with exhaust fans is installed. Plants that must keep going during an air raid are able to carry on with the aid of automatic regulators when the workmen are compelled to take cover.

Wartime plant lighting has also been found to have considerable influence upon the health of the workers—and on the output of the factory. Now that longer hours are spent under artificial lighting, factory production is maintained at high level by the use of low-surface-brightness units with diffusion screens masking filament lamps, or by the use of 60-in. 80-watt tubular fluorescent lamps which eliminate glare. The necessary blacking-out of skylights tends to have a depressing effect upon workers, for it cuts out the sunlight. So an artificial skylight effect is produced by rooflights of up to eight 80-watt fluorescent lamps in a glazed fixture. The minimum lighting intensity recommended by the Departmental Committee on Lighting in Factories is raised from 1 foot-candle at floor level to 6 foot-candles 3 ft. above the floor. High-pressure mercury-vapor lamps have been found the best source on account of their increased visual acuity, although they give the workers' faces a much more eerie appearance than do fluorescent lamps.

To meet the great demand for efficient hygienic means of handling milk in bulk, centrifugal milk pumps are being developed, pockets in the passageway being avoided so that the milk must flow evenly and smoothly from suction inlet to outlet free from stagnation dangers. Stainless steel, monel metal and aluminum are used in these pumps.

New designs in continuous evaporators eliminate all metallic contact in the concentration of products such as vitamin extracts. Continuous multi-circulation high-vacuum evaporators are used for concentrating fruit juices without losing their flavor.

New plant equipment recently developed in the British food industry includes a pump that eliminates the grinding abrasions of massecuite crystals in sugar factories by using water connections to a rotor spindle for the intermittent washing away of any hardened massecuite. A self-operating machine which improves the plasticity of fats by dispersing and atomizing contained air has been introduced to the edible-fat industry for emulsifying margarine mixtures.

For the transport of food in ships (a very important wartime branch of the industry) there has been devised a marine storage thermometer based upon the discoveries of the Low Temperature Research Station. It utilizes a "null" or balancing method of reading, with greater freedom from vibration and greater accuracy.

# Quality Control of Operations In the Beverage Plant

## Part III*—Functions of the Laboratory

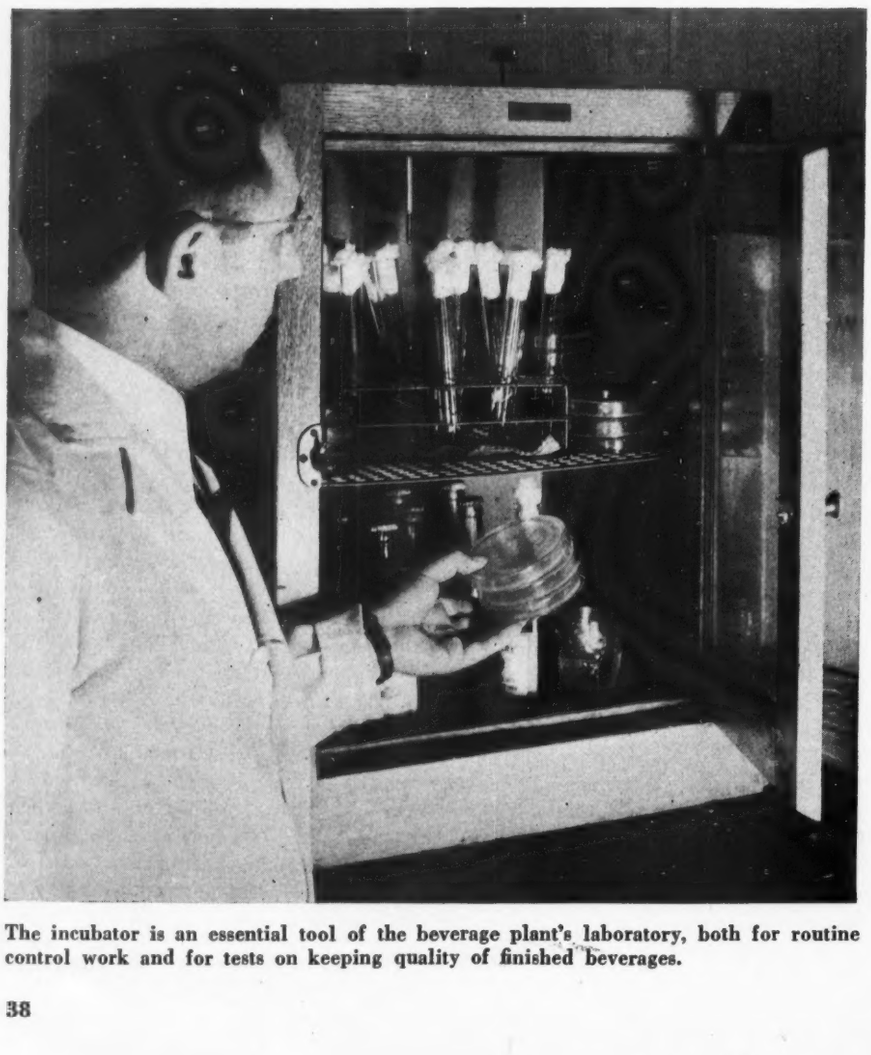
By S. S. EPSTEIN, *Chemist, and* M. KIRSCH, *President, Kirsch's Beverages, Inc., Brooklyn, N. Y.*

QUALITY control of operations in the beverage plant is centered in the laboratory. Sanitary practices, sirup preparations, water treatment and carbonation are under the direct guidance of the laboratory. Actual tests of raw ingredients and of the beverage at various phases of production are naturally made in the laboratory.

In our plant, the laboratory, a room 12x17 ft., is at one corner of the building. It is adjacent to the extract room and directly opposite the sirup room. Work benches, 36 in. above the floor and 26 to 28 in. in breadth, are built against about two-thirds of the room walls. A single work bench, 30 in. above the floor and measuring 76x20 in., is in the center of the room. In one corner is the chemist's desk.

Large storage areas are built-in under each work bench. This unusual storage space is necessary because of the nature of the analyses and studies necessary in beverage plant control.

* Part I appeared in FOOD INDUSTRIES, January, 1941, and Part II in FOOD INDUSTRIES, February, 1941.



**The incubator is an essential tool of the beverage plant's laboratory, both for routine control work and for tests on keeping quality of finished beverages.**

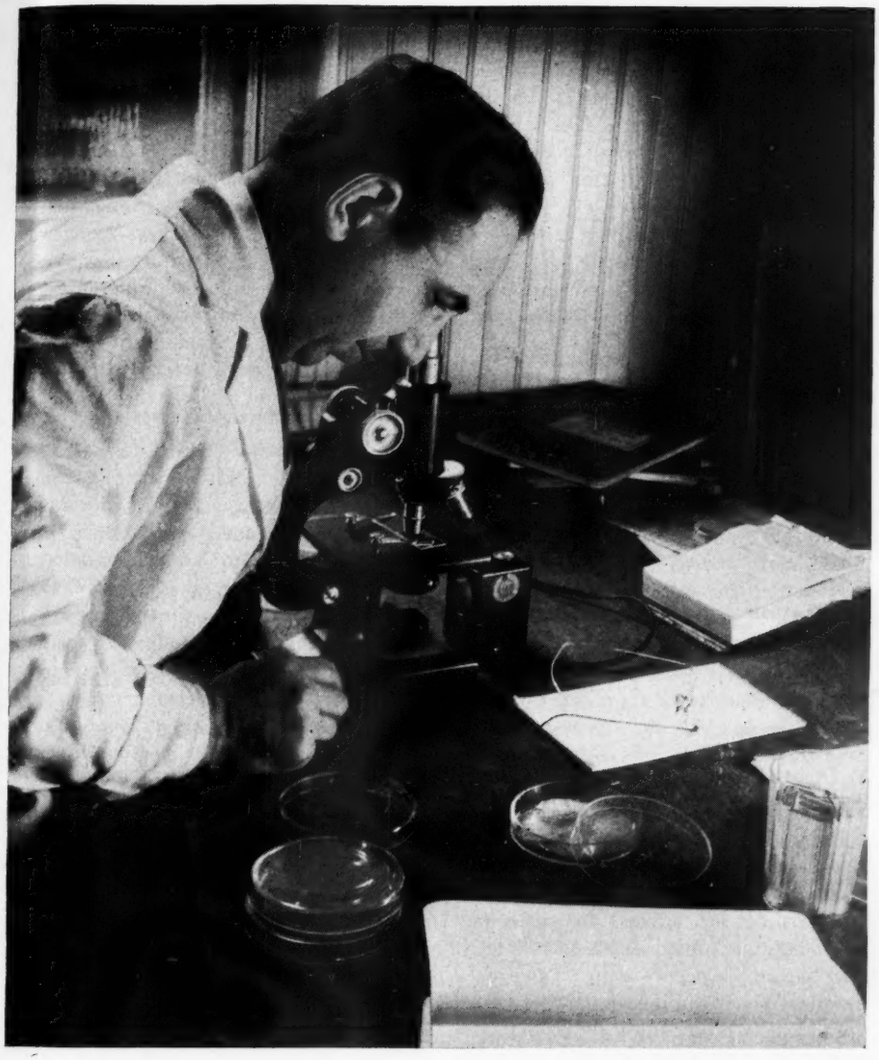
The essential equipment necessary for routine control tests include both bacteriological and chemical requirements. For bacteriological analyses the necessary materials include culture tubes, Petri dishes, pipettes, autoclave, hot-air oven, incubator, bacteriological media and a microscope with accessories. Essential chemical equipment required for quality control includes a carbon dioxide tester with accessories, hydrometers, cylinders, chemical stirrer, thermometers, acid and alkali reagents, a pH meter, glassware and various sizes of graduates.

The principal bacteriological media used for testing materials in the carbonated beverage plant are best suited for growth requirements of microorganisms most likely to develop in finished drinks, namely, yeasts and aciduric bacteria (bacteria which grow well in acid conditions). We have prepared malt extract broth by adding 1.0 gram of dipotassium phosphate, 5 grams of Bacto peptone, 10 grams of dextrose and 15 grams of Bacto malt extract to 1,000 c.c. of distilled water. The mixture is steamed in an autoclave for 10 to 15 minutes and then filtered through paper. Adjustment is then made with half-normal sodium hydroxide to pH 5.4 and the medium distributed in culture tubes and sterilized at 12-15 lb. steam pressure for 15 minutes. To make malt extract we add 20 grams of agar-agar to 1,000 c.c. of malt extract broth adjusted to pH 5.7-5.8 before sterilization.

In testing water we use standard nutrient agar as well as malt extract agar. For tests for the presence of coliform bacteria we use procedures in accordance with standard methods for the examination of water and sewage.

### *Collecting Samples*

To collect samples for bacteriological tests we use large sterilized cotton-plugged culture tubes (8x1 in.) for securing water from various outlets and sugar solutions from the Seitz sirup filter



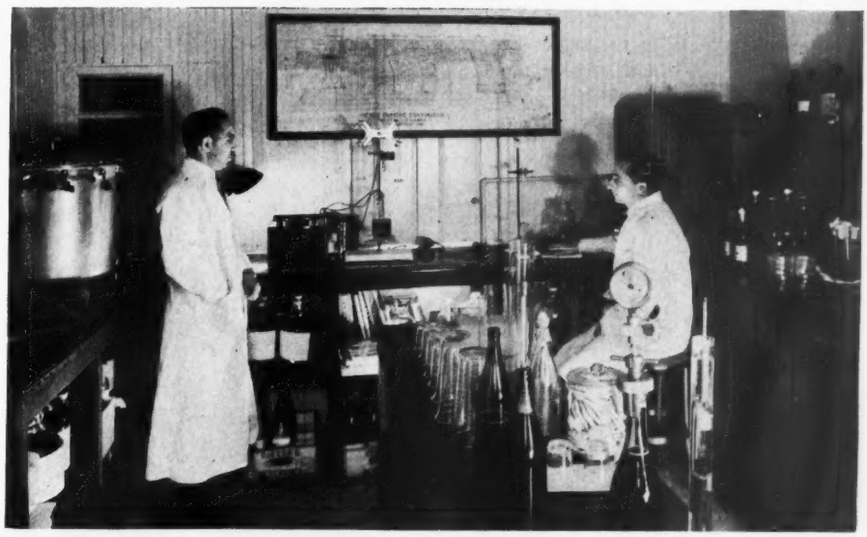
**Identification of microorganisms by microscope plays an important part in the quality control procedure of the beverage plant.**

To test the efficiency of the processing from the sirup room to the finished product tests are made as follows: Sugar solutions at the outlet of the Seitz filter are rapidly collected in a large cotton-plugged sterile culture tube and 2- and 3-c.c. quantities are plated with malt extract agar and 2-c.c. quantities inoculated into large tubes of sterile malt extract broth. Flavored sirup is pipetted directly from tanks and the contents immediately delivered into sterile Petri dishes for plating and into tubes of sterile broth. The sterile pipettes used for withdrawing sirup are ordinary 10-c.c. Mohr pipettes, graduated between marks, with the tips cut and ground to approximately 3-mm. internal diameter.

The flavored sirup from the siruper is collected in an appropriate sized bottle previously sterilized as described. The bottle is placed on the conveyor leading to the siruper, then the paper wrapper together with the cotton plug are removed and held in one hand while the said bottle identified by a rubber band makes its journey through the siruper mechanism. On its way to the filler the bottle is removed and replugged. Bacteriological testing is the same as for the other sirups.

outlet. Liquid sirup and caramel are collected in sterile wide-mouth jars. Sterile containers for obtaining sirup samples from the siruper are prepared as follows: 2 c.c. of distilled water is introduced into a bottle and the mouth stoppered with cotton so that the cotton protrudes about ½ in. The cotton plug and part of the neck of the bottle are covered with ordinary brown wrapping paper and held in place by means of a rubber band. Such a bottle is then sterilized at 20-lb. steam pressure for 20 minutes.

The daily routine of the laboratory staff usually begins with an inspection of the sirup room, checking of the temperatures and causticities of the various compartments of the bottle-cleaning machines, testing for free rinsing of cleaned bottles (complete removal of alkali) and the checking of the plant gas-testing gages.



**Clean bottles are assured by a regular routine of tests on the concentration of caustic in the various compartments of the bottle washers. Carbonation testing in foreground. Left, Dr. Epstein, right, Mr. Kirsch.**

In processing our beverages, no preservatives are employed and the stability of the finished product is solely dependent upon adherence to precise sanitary practice. It is obviously most important to restrict to a minimum all possible contacts of microbial life with any and all ingredients during the entire processing operations.

Three bottles of the finished product are also taken for testing. One bottle is chilled in ice water, the neck lightly flamed, the crown removed and 8 to 9

c.c. of the contents removed by means of a sterile pipette. Four to five cubic centimeters is plated with malt extract agar and 3 c.c. inoculated into tubes of sterile malt extract broth. Incubation of plates and tubes are for 3 to 5 days at 28 deg. C.

In addition to bacteriological analyses of the finished product, the gas content and the sugar content are always determined. At various times the acid and pH values are also determined by means of electrometric titration assembly which is an accessory to our Beckman pH meter. These determinations are recorded and serve as important future reference values.

One of the two remaining bottles of finished beverage is decapped and the mouth stoppered with a sterile cotton plug. Both crowned and plugged bottles are then labeled and shelved at laboratory temperature for two weeks, after which time both are carefully examined by vision and with the microscope for any evidence of microbial growth or physical abnormality. In the event that the plugged bottle is abnormal, all findings are recorded and the capped bottle held for further observation. This simple procedure will often decisively indicate the role of carbon dioxide as a microbial growth inhibitor and the role of air as a microbial growth stimulator.

Results of tests of the sugar sirup and finished product at the various stages of the bottling processes measure the sterilizing efficiencies of the procedures employed.

### *Testing Cleaned Bottles*

Bacteriological tests of bottles on the conveyor from the bottle cleaning machine to the siruper will determine the germicidal efficiency of the bottle washing and bottle sterilizing processes. As a bottle comes out of the machine, it is grasped with one hand and the mouth stoppered with a sterile cotton plug removed from a similar size bottle previously sterilized as described. Practical sterility and absolute sterility tests are made on at least six bottles. In the practical sterility tests 50 c.c. of sterile tap water is added to one bottle, the bottle swirled so as to secure a rinsing effect and 5 c.c. of the liquid is plated with malt extract agar. The plates are incubated for 3 to 5 days at 28 deg. C. Colony counts are multiplied by 10 to secure the number per bottle. Counts of less than 40 colonies per bottle, of which yeast colonies are less than 20, are considered indicative of practical sterility. In absolute sterility tests, 20 to 30 c.c. of sterile malt extract broth is added to each bottle, the bottle swirled and then held at room temperature for 6 to 7 days. Daily observations are made for evidence of growth.

Results from tests of water from the Seitz filter and results from tests of carbonated water from the filler complete detailed evidence of the biological picture in the processing operations.

From the foregoing considerations, it is apparent that our aim is to produce an absolutely sterile product. It would, however, be far fetched to make any such claim. Nevertheless, our directed effort at an ideal does help to give us a practically sterile product. By the term "practical sterility" we infer that the microbial population, if any, is sufficiently low so that the possibility of subsequent increase to proportions of visible manifestation is kept at a minimum.

The question of the minimum numbers of microorganisms initially present in a bottle of carbonated beverage necessary for development to subsequent phases of sedimentation or flocculation or turbidity has often been raised. Experimental seedings of flavored sirups with graduated numbers of pure strains of microorganisms would provide an indication of probability. A completely satisfactory answer to that question is undoubtedly difficult because of differences in chemical characteristics in various beverages and because of inherent difference in characteristics of vitality of various types of microorganisms which may get into any particular type of beverage.

### *Beverage Tests*

In the past few years we have examined several hundred bottles of various flavored beverages. With beverages containing no added edible acid, carbonated with 3.0 to 3.6 volume of gas and having pH values of 6.0–6.2 after decarbonation we have experienced no evidence of biological spoilage in capped bottles after standing for more than eight months at room temperature when the apparent initial numbers of microorganisms were less than 25 per cubic centimeter of which the numbers of yeasts were less than 15 per cubic centimeter. With similar beverages contained in bottles which have been decapped and stoppered with sterile cotton so as to permit escape of carbon dioxide and entrance of air, evidence of microbial spoilage was frequently observed within 10 to 14 days.

In the case of beverages containing edible acid, carbonated with 3.0–3.6 volumes of gas and having pH values of 2.8–3.0 after decarbonation we have found no spoilage when the apparent initial numbers of microorganisms were less than 30 per cubic centimeter, of which the numbers of yeasts were less than 20 per cubic centimeter.

Our findings should not be considered as all-conclusive. It happened to be our personal observations during the course of routine bacteriological examinations of finished products. The fact that 15 to 20 yeasts cells per cubic centimeter in a sugar medium did not develop merely indicates the necessity of the presence of air or oxygen to initiate growth. It also indicates that carbon dioxide is a growth repressant.

### *Practical Sterility*

In the strictest sense, sterility means absolute absence of all living matter. The presence of one minute yeast cell would mean that the product or substance in question is not sterile. However, the presence of one yeast cell would not be unqualified assurance of the development of growth in the usual geometric

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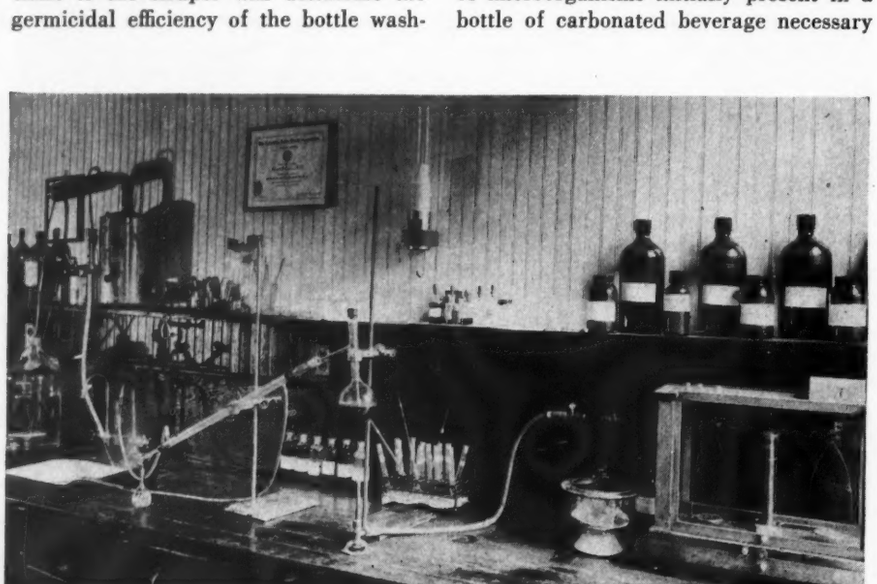


**Development and testing of new flavors, sirups and concentrates are important functions of the beverage-plant laboratory.**

# How to Measure Bulk Quantities of Liquids

**Ways to accurately determine the volume and weight of liquids in tanks of different shapes. Temperature, distortion of container, effect of separated solids, froth and suspended bubbles must be taken into consideration**

By NEAL M. CARTER, *Pacific Fisheries Experimental Station, Prince Rupert, B.C.*

**PART I**

HOW much is a gallon? One sure answer is "four quarts." But an equally apt reply is "It all depends!"—without casting the slightest aspersion upon reputable firms handling liquids by the gallon.

First of all, it depends on whether we are speaking of a U. S. gallon or a British Imperial gallon. When the term "gallon" is used in expressing liquid measure in the United States, the U. S. gallon is generally implied. In Canada, a gallon of most liquid commodities from vinegar to gasoline means an Imperial gallon, although for commercial purposes some products such as fish oils are handled in terms of U. S. gallons.

Then it also depends on whether we are speaking of the *capacity* of a gallon container or the *quantity* (not volume) of liquid it will contain. The capacity remains constant, but the quantity of liquid it will hold can vary. The distinction may be slight, but can be technologically significant.

As a unit of capacity, the present U. S. gallon is the old English Queen Anne wine gallon, whereas the present Imperial gallon is defined as:

> ". . . the volume of 10 pounds avoirdupois of pure water, as weighed in air against brass weights, the water and air being at the temperature of 62°F. and the barometer at 30 inches."

These definitions lead to the unequivocal relations given in Table I, which are entirely independent of the nature or condition of the liquid being measured.

However, when dealing commercially with considerable volumes of liquids, it is found that expression of a *quantity* of liquid in terms of gallons or any other capacity unit is not alone sufficient. A lot depends on the temperature and physical state of the liquid, on whether it is a single substance or a mixture, and on several other considerations that will be mentioned later.

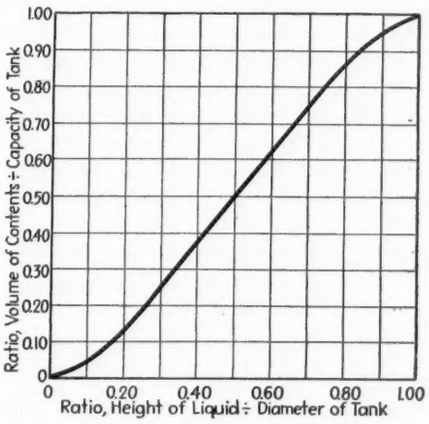



**Fig. 1. Volume of contents in horizontal cylindrical tanks.**

Liquids and their containers have a habit of expanding on warming and contracting on cooling. This statement in itself suffices to indicate the inadequacy of expressing the measurement of a *quantity* of liquid merely as so many gallons, liters or cubic feet without further pertinent data. By this repeatedly emphasized word "quantity" is meant the potential utilization value of a liquid for some particular purpose. Take, for example, the motorist who drives up to a gasoline station and asks for the usual "10 gallons of gas." Now 60 *pounds* of his favorite brand of gasoline, freshly pumped from the underground tank at a temperature of 45 deg. F., will just fill the 10 U. S. gallon glass reservoir of the gasoline station pump, and if immediately run into the tank of his car, this quantity of gasoline represents a potential 170 miles of driving. But if business is slack and the next 10-gal. lot of gasoline pumped into the glass reservoir stands and warms up to 90 deg. in the sun, it expands and almost exactly one quart drains back down the overflow pipe, still leaving the 10-gal. reservoir full. The quart of gasoline that overflowed weighed about 1.6 lb., so that the next motorist, purchasing this warm 10 U. S. gal. now in the reservoir, gets only 58.4 lb. of gasoline representing a potential driving radius of only 165½ miles since the motive power depends on the *quantity*, not the volume. A pound of gasoline is a pound of gasoline, whether it is warm or cold, but how much is a gallon of gasoline?

**Table I—Conversion Factors for Capacities.**

| | |
|---|---|
| 1 U. S. gal. = | 231.000 cu.in. = 0.133680 cu.ft. = 3.78533 liters = 3785.43 c.c. |
| 1 Imp. gal. = | 277.417 cu.in. = 0.160542 cu.ft. = 4.54596 liters = 4546.09 c.c. |
| 1 U. S. gal. = | 0.83268 (approx. $\frac{5}{6}$) Imp. gal. |
| 1 Imp. gal. = | 1.20094 (approx. $\frac{6}{5}$) U. S. gal. |

### *Technological Practice*

Considerable exactitude is demanded in the control of certain processes in modern food and other industries in order that standards and uniformity of quality may be maintained. In delicately adjusted processes involving the use of liquids under varying conditions, a knowledge of the actual *weight* of the liquid, rather than its volume alone, may therefore be essential to ensure that the proper *quantity* of liquid is being employed.

However, commercial transactions and technological processes involving liquids frequently call for the handling of quantities too great for convenient direct determination in terms of weight, particularly if a desired quantity is being run off from a fixed supply tank. The expression of the quantity in terms of weight must then be derived from intermediate

measurements of volume or capacity, combined with a knowledge of the characteristics and prevailing condition of the material.

One method of determining the weight of a bulk quantity of liquid, other than by actual weighing, is to attach a pressure-measuring device to the bottom of a tank having vertical sides. The gage reading, in pounds per square inch, multiplied by the tank's horizontal cross-sectional area, in square inches, gives the number of pounds of liquid in the tank irrespective of any expansion or contraction of the liquid. Appreciable congealing of the liquid, as in certain vegetable and animal oils at low temperatures, or accumulation of solids at the bottom of the tank, may lead to failure of this method.

The indirect method, namely, expression of volume or capacity in terms of weight, is more generally used. It is applied in various ways but consists essentially of most or all of the following steps:

*a.* Determination of the volume, or a difference in volume.

*b.* Measurement of the temperature of the liquid.

*c.* Expression of the volume at the measured temperature, in terms of the volume at some reference temperature (commonly 60 deg. F.).

*d.* Application of a conversion factor relating the volume of the particular liquid to its weight, at some definite temperature.

Various short-cuts are available. Step (*c*) is unnecessary if the volume is determined at or very close to the reference temperature, or if no particular reference temperature is necessary. For mixtures that partially congeal or melt within the temperature ranges encountered, it may be necessary under steps (*c*) and (*d*) to allow for additional volume changes due to this change in physical state of the mixture, as will be indicated later. Charts or tables may be prepared to apply to specific equipment and liquids in such a way as to combine two, or even three, of the steps in one operation.

Steps (*c*) and (*d*) may be used in reverse order to determine the volume of liquid at a desired temperature when the weight is known.

### *Volume Measurements*

Various types of flow meters are available for measuring a volume of liquid directly in gallons or cubic feet, and by means of thermocouples or bimetallic elements immersed in the flowing liquid, the mechanism actuating the volume-registering dials can be controlled to partially compensate the measured volume for temperature of the liquid when this differs from some standard temperature. But when a metering device is not available or feasible, the determination of a bulk volume of liquid is usually associated with the capacity of a container conforming to some regular geometric shape, or with the height of the liquid in the container as related to its shape.

The volume of liquid in variously shaped tanks having *vertical sides*, when filled to height $H$, is given in Table II. Since the value of $L^2$, $WL$, $R^2$, $D^2$ or $AB$ is fixed for a given tank, this value may be multiplied by the appropriate numerical constant as shown in the table, to give a new constant, $C$, applying to that tank. Then:

Vol. of liquid $= C \times$ vert. height of liquid $= C \times H$.

It readily follows that by means of this relation a table or chart may be constructed, or a gage-glass may be calibrated, from which the volume of liquid corresponding to any $H$ in that tank may be read directly.

The volume of liquid in a *pyramidal* or *cone-shaped* tank having straight sloping sides and a vertical axis is ascertainable from the following relation when the tank comes to a point at the *bottom*:

$$\text{Vol. of liquid} = (\text{vert. ht. of liquid})^3 \times \frac{\text{total capacity of tank}}{(\text{vert. inside height of tank})^3}$$

The factor "total capacity of tank" can be ascertained from the appropriate formula in the right-hand column of Table II, applicable to the shape of the tank's base, by making $H$ equal the vertical inside height of the tank and taking *one-third* of the resulting computed value. Since the fractional term of the above expression is a constant for any given tank, the value of this constant may be used in the construction of a table, chart or graduated gage-glass applying to that tank, as previously intimated. If more convenient for measurement (particularly by gage-glass), the level of the liquid may be read along the *slope* of

*(Turn to page 89)*

**Table II—Volume of Liquid in Vertical Tanks.**

| *Shape of horizontal cross section of tank* | *Inside dimension (s) measured horizontally* | *Volume of contents when filled to height H* |
|---|---|---|
| Equilateral triangle | length of side ($L$) | 0.43301 $L^2H$ |
| Square | length of side ($L$) | 1.00000 $L^2H$ |
| | or length of diagonal ($D$) | 0.50000 $D^2H$ |
| Rectangle | width ($W$), length ($L$) | 1.00000 $WLH$ |
| Regular pentagon | length of side ($L$) | 1.72048 $L^2H$ |
| Regular hexagon | length of side ($L$) | 2.59808 $L^2H$ |
| | or greatest diameter ($D$) | 0.64952 $D^2H$ |
| Regular octagon | length of side ($L$) | 4.82843 $L^2H$ |
| | or greatest diameter ($D$) | 0.70711 $D^2H$ |
| Circle | radius ($R$) | 3.14159 $R^2H$ |
| | or diameter ($D$) | 0.78540 $D^2H$ |
| Ellipse | shortest diameter ($A$) and longest diameter ($B$) | 0.78540 $ABH$ |

**Table III—Volume of Contents in Horizontal Cylindrical Tanks.**

| Ratio $\frac{H}{D}$ = Ht. of liquid / Diam. of tank | Ratio $\frac{H}{D}$ = Vol. of contents / Capacity of tank | Diff. | Ratio $\frac{H}{D}$ = Ht. of liquid / Diam. of tank | Ratio $\frac{H}{D}$ = Vol. of contents / Capacity of tank | Diff. | Ratio $\frac{H}{D}$ = Ht. of liquid / Diam. of tank | Ratio $\frac{H}{D}$ = Vol. of contents / Capacity of tank | Diff. | Ratio $\frac{H}{D}$ = Ht. of liquid / Diam. of tank | Ratio $\frac{H}{D}$ = Vol. of contents / Capacity of tank | Diff. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 0.00000 | 0.00169 | 0.13 | 0.07639 | 0.00870 | 0.25 | 0.19550 | 0.01110 | 0.38 | 0.34869 | 0.01239 |
| 0.01 | 0.00169 | 0.00308 | 0.14 | 0.08509 | 0.00897 | 0.26 | 0.20660 | 0.01124 | 0.39 | 0.36108 | 0.01245 |
| 0.02 | 0.00477 | 0.00397 | 0.15 | 0.09406 | 0.00921 | 0.27 | 0.21784 | 0.01137 | 0.40 | 0.37353 | 0.01250 |
| 0.03 | 0.00874 | 0.00468 | 0.16 | 0.10327 | 0.00945 | 0.28 | 0.22921 | 0.01149 | 0.41 | 0.38603 | 0.01255 |
| 0.04 | 0.01342 | 0.00527 | 0.17 | 0.11272 | 0.00968 | 0.29 | 0.24070 | 0.01161 | 0.42 | 0.39858 | 0.01259 |
| 0.05 | 0.01869 | 0.00580 | 0.18 | 0.12240 | 0.00989 | 0.30 | 0.25231 | 0.01173 | 0.43 | 0.41117 | 0.01262 |
| 0.06 | 0.02449 | 0.00628 | 0.19 | 0.13229 | 0.01009 | 0.31 | 0.26404 | 0.01183 | 0.44 | 0.42379 | 0.01265 |
| 0.07 | 0.03077 | 0.00671 | 0.20 | 0.14238 | 0.01028 | 0.32 | 0.27587 | 0.01192 | 0.45 | 0.43644 | 0.01268 |
| 0.08 | 0.03748 | 0.00710 | 0.21 | 0.15266 | 0.01046 | 0.33 | 0.28779 | 0.01202 | 0.46 | 0.44912 | 0.01270 |
| 0.09 | 0.04458 | 0.00746 | 0.22 | 0.16312 | 0.01063 | 0.34 | 0.29981 | 0.01211 | 0.47 | 0.46128 | 0.01272 |
| 0.10 | 0.05204 | 0.00781 | 0.23 | 0.17375 | 0.01080 | 0.35 | 0.31192 | 0.01218 | 0.48 | 0.47454 | 0.01273 |
| 0.11 | 0.05985 | 0.00812 | 0.24 | 0.18455 | 0.01095 | 0.36 | 0.32410 | 0.01226 | 0.49 | 0.48727 | 0.01273 |
| 0.12 | 0.06797 | 0.00842 | 0.25 | 0.19550 | | 0.37 | 0.33636 | 0.01233 | 0.50 | 0.50000 | |
| 0.13 | 0.07639 | | | | | 0.38 | 0.34869 | | | | |

# Antiseptic Ice Reduces Spoilage

**Proves effective in commercial tests in Northwest fishing industry. Made by adding chlorine compound to water before freezing.**

By MANDUS E. BRIDSTON, *Port Blakely, Wash.*

HISTORY was made in the fishing industry recently when Captain Olson brought "The Seal" and its cargo of well-preserved salmon into port at Seattle. This fish was 11 days out, and even though iced, the cargo ordinarily would have suffered heavy casualties from spoilage. But the 11-day-old fish was firm of flesh and had lost no bloom. You couldn't tell the difference between it and day-old fish. A bacteria count showed only 686,000 bacteria per gram, and a count of 56,500,000 might have been expected.

The secret of Captain Olson's cargo was that it had been preserved by "antiseptic ice." This is a new "chlorinated" refrigerant perfected by Lawrence Frandsen, chemist, who is now president of National Antiseptics, Inc., Seattle.

Much is expected from this sterile ice. It promises to reduce greatly the heavy spoilage losses in the Pacific Northwest fishing industry. These losses have been estimated at 25 percent due to downgrading and 4 percent by outright spoilage, even though all ocean-going boats carry ice in the hold.

**"The Seal's" 11-day old catch of salmon was remarkably well preserved because it had been refrigerated with "antiseptic ice."**

*This article on*

**REFRIGERATION**

*Is of interest to*

**All Handlers of Perishable Foods**

**Because it describes a new refrigerant with bacteria killing power and cites its success in commercial tests in the fishing industry. The greatest need for such a refrigerant is in the fishing industry, and it was for this industry that the antiseptic ice was developed. But the refrigerant has possibilities in other fields where ice is used.**

*The Editors*

And in the opinion of Dr. Harvey C. McMillin, professor of zoology at Seattle Pacific College, salmon shipped from Seattle to New York under this new refrigerant would arrive fresher and firmer than salmon just off the boat using ordinary ice. And as a result of tests at Seattle Pacific College by Charles F. Shockey, bacteriologist, the antiseptic ice will probably be used exclusively on all shipments of fish from Seattle to points East. From one to two carloads is shipped a week.

The antiseptic ice is made by mixing a powder called "Nipicide" with the water that is to be frozen. Not only does it kill the bacteria on the fish (bacteria that would be carried into the carcasses when they were opened for cleaning) but it kills also the bacteria in the water from which the ice is made.

The preserving power of the new ice was clearly demonstrated on board "The Seal," not only by the condition of the fish, but by the absence of the customary strong fishy odor in the hold. Moreover, bilge water from the boat had only a slight odor of the sea, where ordinarily it would have smelled more like the sewer than the sea.

Antiseptic ice will cost about 30 percent more than ordinary ice, it is stated. But it is estimated that the new product will save over 2,000,000 lb. of fish annually in the halibut industry alone, not to mention the better flavor of the fish refrigerated with it.

Commercial experiments with the new ice have been limited to the fishing industry, and it is anticipated that this industry will use 500,000 tons of the ice next season. A factory has been blueprinted to take care of the expanding volume.

Mr. Frandsen worked for years on this refrigerant. Others too pondered the idea. Some experiments have been made with formaldehyde as the ingredient to put into the water before freezing. This, however, has not proved successful. Hypochlorides also have been used. But as a rule chlorine compounds are very volatile and quickly lose their antiseptic qualities when brought into contact with organic substances. Apparently Mr. Frandsen has overcome these difficulties in his new refrigerant. Not only does his chlorine compound "release" slowly, but it "withstands" freezing to a remarkable degree.

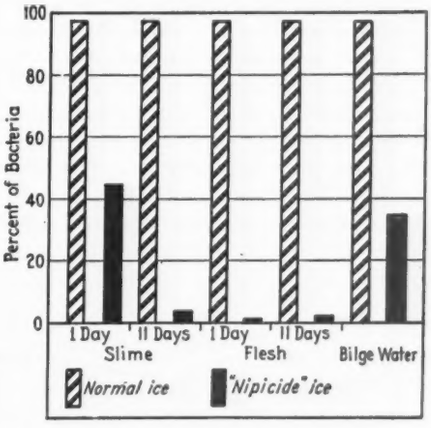



**Chart showing effect of "antiseptic ice" on bacterial content of fish, slime and bilge water when used as refrigerant on boat. The comparison between it and normal ice given here is relative.**

# Diesels Cut Fuel Cost 60% In Long-haul Trucking

**Net saving is $1,781 per truck per year. Tractor-trailers operate at fuel cost of 1.31 cents a mile. Drivers suffer less fatigue, have fewer accidents**

SAVINGS of approximately 60 percent in fuel expense, based on the first year's operation, have been made by the Northampton Brewery Corp. on certain of its automotive hauls through the use of diesel-engine tractors and trailers and full cooperation between the operator, the tractor manufacturer and the lubrication engineer of one of the well-known oil companies.

The problem, in brief, was to obtain the lowest possible fuel expense on certain long-distance distribution hauls between the Northampton company's main brewing plant and two of its bottling plants, with other factors of gross and payload weights, road distances and time in transit remaining constant.

The Northampton Brewery Corp.'s main brewing plant is located in Northampton, Pa., where it brews its brands of "Tru-Blu" beer and ale. The hauls involved were between Northampton and two Tru-Blu bottling plants located, respectively, in Washington, D. C., and Charleston, S. C., approximately 175 miles and 700 miles by road from Northampton.

Outbound loads from Northampton, consisting of full aluminum barrels of beer, gross 40,000 lb. with a payload of 24,000 lb. Return loads of empty aluminum barrels gross 20,000 lb. with 4,000-lb. payloads.

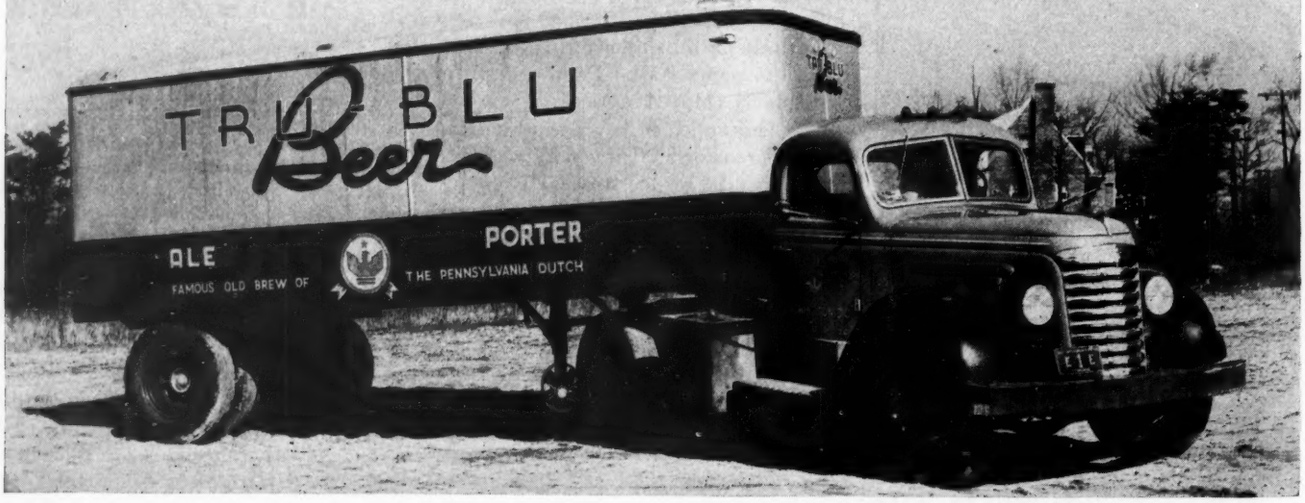
While the Northampton company maintains other bottling plants and other distributing warehouses in principal cities along the Atlantic Seaboard, these are not involved in the operation discussed herewith.

It may be stated, in passing, that the establishment of bottling plants in key cities and the transfer of beer in aluminum kegs between the main brewery and these bottling plants, instead of moving bottled beer between the same points, saves the otherwise nonproductive expense of moving the weight of the glass bottles in both directions between the same points. The Northampton company also maintains separate retail-delivery truck fleets for final distribution of both the kegged and bottled beer at several points, but, again, these do not enter into the automotive problem under discussion.

### *Two-cycle Diesels Selected*

After a full analysis of the different makes and types of diesel-engine trucks available, by the Northampton company's transportation manager, Mr. Alexander P. Perlov, the "G.M.C." diesel type was selected. A fleet of three of the 600 Series G.M.C. tractors, with 3-71, two-cycle diesel engines and with frameless semi-trailers designed by Mr. Perlov, were obtained and put into service in 1940.

After almost a full year's operation, the fuel consumption on the diesel tractors has averaged 8.5 miles to the gallon




**One of the "G.M.C." diesel tractor-trailer combinations operated by the Tru-Blu Beer Corp., Washington, D. C., an affiliate of the Northampton Brewery Corp., of Northampton, Pa. The trailer, of frameless construction, was designed by A. P. Perlov, transportation manager of the Northampton company, and constructed in the company's shops.**

of fuel oil at a cost of 11.2 cents per gallon including tax. This gives a fuel cost per mile of 1.31 cents. The straight gasoline-engine tractors formerly employed averaged only 3.5 miles to the gallon of gasoline at a cost of 14.5 cents per gallon, or a fuel cost at the rate of 4.14 cents per mile. The difference in fuel cost between the diesel tractor and the conventional gasoline tractor is thus 4.14 cents minus 1.31 cents, or 2.83 cents per mile.

On the basis of an average run of 70,000 miles per year per tractor, the total mileage run to date by the three units being 206,000 miles, the fuel oil cost on the diesel job is $919 for 8,230 gal. as compared with $2,900 on the straight gasoline tractor for 20,000 gal. The gross difference, or saving, per unit in favor of the diesel tractor is thus $2,900 minus $919, or $1,981 per year.

Allowing an additional $200 per diesel tractor per year to cover the greater diesel tractor investment with its higher depreciation and interest charges, and allowing for the higher license expense, the net reduction per diesel unit is $1,781 per year. This is a fuel saving of 61.4 percent of the previous yearly gasoline fuel bill of $2,900.

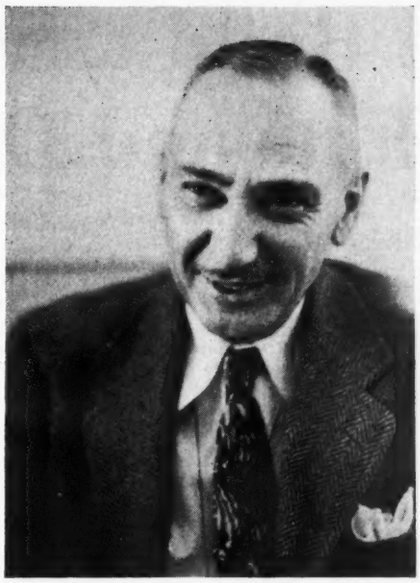
The above average net saving of $1,781 per year per diesel tractor, or 61.4 percent of the fuel bill, was most gratifying to the Northampton company. And it has amply justified the continuance of the diesel operation—even its extension to include any additional future hauls of a like nature.

### *Technical Problems Solved*

But it was not all just as simple as that, for several minor but important problems arose in the course of the first year's operation. Readjustments were found necessary in connection with the fuel oil, the engine lubrication, the training of diesel mechanics and the system of maintenance and inspection.

Before the above work was attempted, the lubrication engineer of the Socony-Vacuum Oil Co. was called in to study the problem. He, in full cooperation with Mr. Perlov of the Northampton company and the representative of the G.M.C. tractor manufacturer, worked out the details of the solution, to the end that all three units are performing satisfactorily with the savings in fuel expense previously stated.

Almost immediately the well-known fact that the fuel oil must be clean for a diesel engine to operate properly was brought home, and adequate strainers were provided on the ground storage and tractor fuel tanks. Next a tendency for the engine oil to oxidize, with a resulting seizing of the sleeves, was overcome by the use of a more suitable diesel oil, in this case "Gargoyle Delvac 500 Series" oil.



**Alexander P. Perlov, transportation manager of Northampton Brewery Corp., Northampton, Pa., and the man who set up and is responsible for the long-haul diesel tractor operation described on these two pages.**

When the three diesel tractors were first put into service, one was based and maintained at Northampton, Pa., one at Washington, D. C., and one at Charleston, S. C. This was changed to one centralized maintenance station at Washington, D. C., where certain of the regular gasoline-engine mechanics were given special training in diesel-engine inspection and maintenance. This centralization of both inspection and maintenance has proved most satisfactory.

Maintenance cost to date has been very low because all three of the units are relatively new. Certain minor engine adjustments were made by the manufacturer during the warranty period without cost to the Northampton company. Mr. Perlov, in charge of the operations for the Northampton company, anticipates that the cost of maintenance will not exceed that of gasoline units, or about 1.75 cents per mile.

The work of the lubrication engineer was performed without charge to the Northampton company in accordance with the oil company's long-established policy of rendering its engineering service gratis to the users of its products as a means of obtaining the greatest values from those products.

One important result of the engineering service has been the attainment of more uninterrupted service by all three of the tractors on their various runs. Other interesting observations were made in the course of the work, including the preference by the drivers for the diesels over the conventional gasoline tractors on the ground that the diesels caused less fatigue in operation. This was attributed to the more even torque of the two-cycle diesel as compared with the ordinary four-cycle truck gasoline engine. The diesels also have better torque characteristics, particularly at low speeds, which tends to reduce the amount of gear shifting done by the driver.

It is further claimed that this lessened fatigue on the part of the drivers on the long runs has resulted in fewer accidents and that what accidents did occur were of a less serious nature.

One accident which had nothing to do with the operation of the diesel tractors as motive power units brought out in an unusual way the greater safety factor of fuel oil as compared with gasoline.

It seems that one night when one of the tractor-trailer units was shuttling along at its usual speed, the dual tires on one side of the semi-trailer dropped into an unseen hole in the road and broke the trailer axle. This tipped the tractor and trailer over on their sides.

The driver was pinned inside his cab for over 15 minutes and was covered with the leaking fuel oil while the diesel engine was still running. He eventually extricated himself and suffered only minor lacerations of the legs.

Mr. Perlov has always felt that if this accident had occurred with an ordinary gasoline tractor, the driver most assuredly would have been burned to death and the tractor damaged by fire beyond repair. As it was, the driver survived, and the diesel tractor was rebuilt and is still in service.

The diesel-tractor drivers further claim that the steady torque of the diesel engines enables them to cover the routes in less running time. This is especially the case on the heavy Pennsylvania grades southwest of Northampton on the run to Washington, D. C.

The more steady torque of the diesel engine is also given credit for two other operating economies, namely the lessened use of tire chains in snowy weather and a resulting increase in tire life.

However advantageous the operating economies made possible by the use of diesel engines may be, the most important factor is the reduction in the fuel expense which normally represents from 25 to 32 percent of total operating costs. When this one item is reduced approximately 60 percent, a real economy has been effected.

# Shall We Build a Stock Pile Of Fats and Oils?

**What would happen to the price of food fats and oils if some of the imported vegetable oils suddenly became unavailable?**

By GORDON W. McBRIDE, *Chemical Engineer, Washington, D. C.*

WHAT is the future for fats and oils? Will imports of foreign oils and oil-bearing materials be temporarily restricted or cut off? Would we have a sufficient stock of imported fats and oils on hand in such an emergency? Will fats and oils prices rise?

These questions have been spotlighted recently in several ways. Shortage of a number of fats and oils has been feared by some. Shortage of shipping required to bring foreign fats and oils to this country has appeared more threatening. There have even been unofficial suggestions that a coconut oil or copra stock pile be built in this country, comparable with the stock piles of strategic metals and minerals. The great importance of maintaining supplies of coconut oil is officially recognized by the plan to require an export license for shipment of copra or coconut oil from the Philippines to any destination other than the United States.

Stocks of coconut oil were on hand in this country on January 1, 1941, sufficient to last only six months at the 1940 rate of consumption. (The 20-year average stocks of coconut oil on hand at this season would last slightly over four months at the average rate of consumption.) It certainly would be disquieting if all imports of coconut oil were to stop abruptly under such circumstances. Yet this is but one of the many foreign fats and oils which domestic industry finds necessary.

Fortunately, the United States is well supplied with edible fats and oils. With the exception of a few drought years, the United States has been on an export basis with respect to food fats for many years. Yet the United States imports hundreds of millions of pounds of foreign fats and oils each year. Those who are familiar with the oils which are imported know that only about a third of this quantity is destined for edible consumption. And this use is only because of preference or economic advantage. There is actually no necessity for importing *any* edible fats and oils from the standpoint of satisfying the food requirement of the nation. More than enough butter, lard, cottonseed oil, soybean oil and other edible oils can be produced in this country to supply the demand. However, a little over a billion pounds of fats and oils are imported each year for soaps, paints and other purposes not in the edible field.

*This article on*

**RAW MATERIALS**

**Should be read by all food manufacturers who produce or use either vegetable fats and oils or competitive animal fats. While the imported oils covered by this article are of primary importance to soap and paint manufacturers, what happens to their availability and price must affect the supply of food fats and oils. The article gives information upon which plans for forward action can be based by producers of:**

***Shortenings, salad oils, butter and margarine and by those who use these ingredients in their product.***

*The Editors*

Assume for the sake of argument that our supply of *all* foreign fats is completely cut off for some reason. What would happen? The lauric-acid-containing coconut, babassu and palm kernel oils, needed in the soap industry, represent better than half of these imported oils which are destined for non-edible uses. Chemically speaking, there is no known domestic substitute for these oils, so presumably the food manufacturer would soon notice that his soaps were not lathering as well as usual, or that perhaps they were a little more expensive.

Synthetic coconut oil has been made, but it has never been economically justifiable under normal circumstances. However, if the natural oil supply were cut off, the soap man would certainly turn to the synthetic, even though this would require building an entire new industry—something more than an overnight job! The food manufacturer who had been using coconut oil would be able to substitute any of a number of domestic oils, with only slight difficulty. The soap and paint manufacturers must have oils with certain chemical characteristics. The food manufacturer is more concerned with the physical and biological characteristics of his raw materials.

The paint oils which are imported are in part replaceable with domestic oil. For example, with proper encouragement, flax for linseed oil could be grown in this country in sufficient volume to satisfy domestic demand. However, domestic tung oil production is just beginning and sufficient domestic production is not in sight for many years. Domestic castor oil production is being studied, but developments have not yet reached the point where an appreciable quantity of oil is available on the market. The faster-

**Table I — Production of Domestic Fats and Oils**

This table shows production of fats and oils from domestic animal and vegetable sources. Domestic production of oils from imported oilseeds is not included. Data from the Departments of Agriculture and Commerce.

| | 1938 | 1939 | 1940(1) |
|---|---|---|---|
| | (Million of pounds) | | |
| Butter | 2,286 | 2,248(1) | 2,300(2) |
| Corn oil | 137 | 151 | 158 |
| Cottonseed oil | 1,678 | 1,390 | 1,273 |
| Fish oils | 204 | 245 | 155 |
| Greases (as reported) (3) | 328 | 379 | 453 |
| Greases (other) (3) | 50 | 50 | 50 |
| Lard | 1,708 | 1,992(1) | 2,300(2) |
| Linseed oil | 157 | 269 | 387 |
| Neats-foot oil | 4 | 5 | 4 |
| Oleo oil | 88 | 76 | 70 |
| Olive oil | 5 | 7 | 4 |
| Peanut oil | 78 | 73 | 84 |
| Soybean oil | 323 | 458 | 537 |
| Stearin (edible) | 46 | 38 | 38 |
| Tallow (edible) | 93 | 94 | 79 |
| Tallow (inedible) (3) | 517 | 602 | 711 |
| Whale oil (4) | 58 | 27 | 20 |
| **Total** | 7,760 | 8,100(1) | 8,600(2) |

(1) Preliminary.
(2) Estimated.
(3) The combined factory consumption of inedible tallow and greases averages about 53 million pounds more annually during the period 1919–1939 than the combined factory production. The balance of production is accounted for on farms and in small, local rendering plants not canvassed by the Bureau of the Census. See "The Fats and Oil Situation," U. S. Department of Agriculture, August, 1940, pages 8 and 15. An arbitrary 50 million pounds of "other greases" is therefore added as a separate item to the reported production of domestic fats and oils.
(4) May include other marine animal oils also.

drying oils, such as perilla and oiticica, have never been produced satisfactorily in this country.

In this case again, however, there is a potential supply of equivalent synthetic oils which would help make up the deficiency of natural oils. One purpose of this development has, of course, been to make the country self-sufficient in its drying oil needs, against just such a day as here assumed.

The thought of the coming of such a day has already given a tremendous stimulus to research. Methods are already being sought whereby available domestic fats and oils might be converted to new products having the desired properties of the foreign fats and oils.

To anticipate interruption in imports of needed fats and oils, and to minimize the shock of any such occurrence, there has been discussion of building "stock piles" of certain fats and oils in this country. The material most frequently mentioned in this connection is coconut oil, or copra, large stocks of which are known to be available in the Far East. It is admitted that this material is needed by the soap man, and it is conceded that there might be interruption or difficulty in obtaining a supply regularly. The argument is that we should maintain a reserve supply in this country sufficient to last at least one year, with the stock kept in proper rotation to avoid deterioration in storage.

In most other cases, the oils are already not available in sufficient quantities to satisfy demand in this country, let alone to build stock piles with a surplus. For example, it is already too late to build a stock pile of tung oil or perilla oil or teaseed oil. Fortunately, our source of babassu and oiticica oils is South America. Hence, interruption in this supply is not likely. Even here, however, these products are being used as fast as they can be produced. There is no surplus available for stock pile.

What would be the effect on the edible oil market of a stock pile of coconut oil or copra in this country? Since coconut oil may be used as an edible oil, what assurance would the food industries have that the coconut oil might not be so diverted? It would certainly seem to hang over the food market under such an arrangement. "Denaturing" of the coconut oil by rendering it unfit for food use is one practical answer to this objection. It should certainly reassure the food manufacturer.

At the end of the emergency, stock piles of the other imported fats and oils could be built to match the coconut oil stock pile. The purpose of the stock piles is to have a supply of fats and oils available when normal imports are restricted. They cannot be built after they are needed—they must be built when we don't need them, and they must be kept as long as we have need for any imports.

**Table II — Imports of Foreign Fats and Oils**

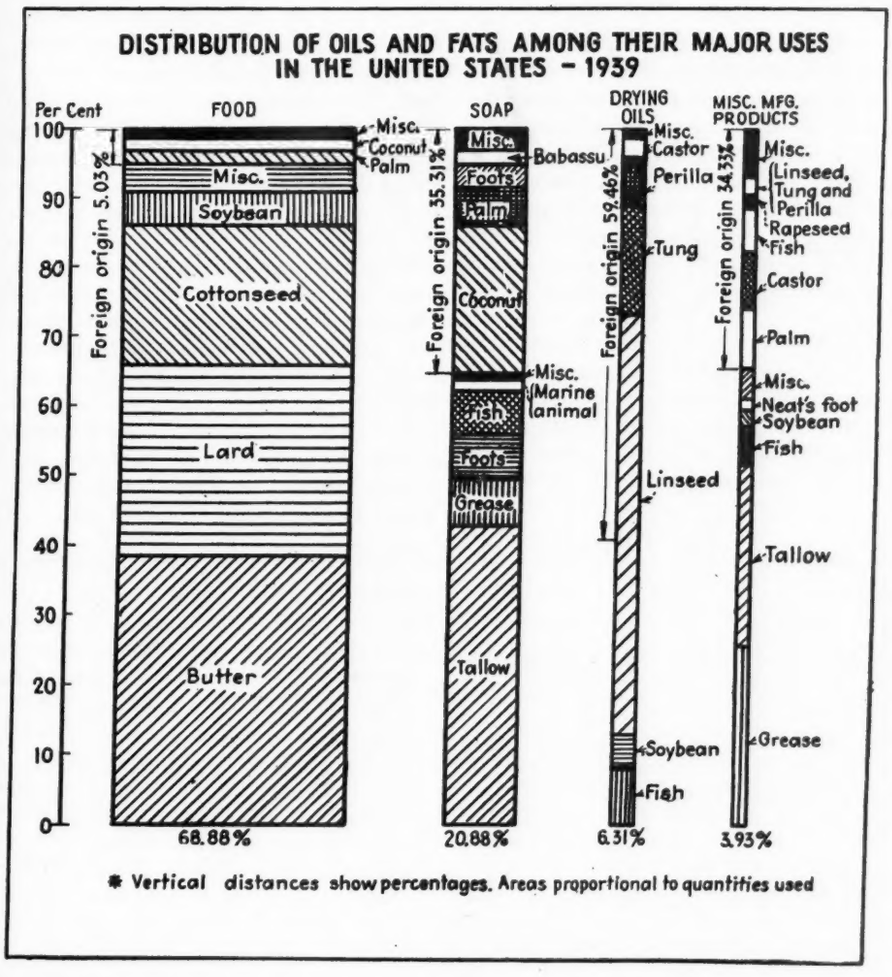
*(Including oil equivalent of seeds, nuts, etc.)*

Some differences may be noted between these figures and those reported by the Department of Commerce and those published by the Department of Agriculture. The Commerce figures are slightly higher than these because they include the vegetable waxes. The Department of Agriculture figures are slightly lower because they do not include a number of unspecified animal and vegetable fats and oils. Slight discrepancies may also be accounted for by the use of different factors for oil yield from imported oilseeds and nuts.

Data from the Departments of Agriculture and Commerce.

| | 1938 | 1939 | 1940(1) |
|---|---|---|---|
| | (Millions of pounds) | | |
| Babassu oil | 32 | 72 | 63 |
| Castor oil | 51 | 73 | 107 |
| Coconut oil | 687 | 608 | 759 |
| Cod-liver oil | 39 | 50 | 16 |
| Corn oil | 22 | 14 | (3) |
| Cottonseed oil (3) | 78 | 29 | 12 |
| Linseed oil | 293 | 305 | 225 |
| Oiticica oil | 5 | 19 | 16 |
| Olive oil (edible) | 71 | 63 | 50 |
| Olive oil (inedible) | 28 | 39 | 30 |
| Palm oil | 271 | 289 | 225 |
| Palm kernel oil | 14 | 6 | 13 |
| Peanut oil | 16 | 4 | 3 |
| Perilla oil | 32 | 51 | 11 |
| Rape oil | 9 | 12 | 15 |
| Sesame oil | 10 | 9 | 7 |
| Soybean oil | 3 | 4 | 5 |
| Teaseed oil | 12 | 5 | 4 |
| Tung oil | 107 | 79 | 97 |
| Whale oil | 22 | 20 | 22 |
| Animal fats and oils (4) | 9 | 10 | 7 |
| Fish oils (4) | 23 | 17 | 4 |
| Vegetable fats and oil (4) | 32 | 37 | 16 |
| **Totals** | 1,866 | 1,815 | 1,707(1) |

(1) Preliminary.
(2) Less than half a million pounds.
(3) Almost all of this is refined oil.
(4) Not otherwise specified.




**This chart shows graphically the relative importance of the food fats and oils, the soap fats and oils, and the drying oils. The relative areas of each specified fat and oil are proportional to the total quantities used. Comparison with the 1938 chart (see "Food Industries," February, 1940, page 61) will show how these proportions vary from one year to another. The chart is based on official data and was prepared by the Bureau of Raw Materials for American Vegetable Oils and Fats Industries.**

**Table III—Stocks and Consumption of Coconut Oil in United States**

*(In millions of pounds)*

| Year (Dec. 31) | Stocks: Copra (oil equiv.) | Stocks: Crude Oil | Stocks: Refined Oil | Stocks: Total | Total Consumption (crude oil) |
|---|---|---|---|---|---|
| 1940 | 44 | 243 | 14 | 301 | 594 |
| 1939 | 44 | 178 | 12 | 234 | 588 |
| 1938 | 46 | 202 | 13 | 261 | 578 |
| 1937 | 62 | 166 | 11 | 239 | 454 |
| 1936 | 13 | 59 | 16 | 88 | 622 |
| 1935 | 50 | 128 | 24 | 202 | 542 |
| 1934 | 19 | 153 | 34 | 206 | 595 |
| 1933 | 75 | 183 | 16 | 274 | 560 |
| 1932 | 35 | 121 | 14 | 170 | 525 |
| 1931 | 32 | 188 | 15 | 235 | 557 |

# Sugar Rendering of Lard Increases Stability

**Simple treatment greatly extends the life of lard. Promises to improve competitive position with respect to other shortenings**

By SLEETER BULL, *Professor of Meats, University of Illinois, Urbana, Ill.*

WITH the loss of our export market, the increase in hog production and the substitution of hydrogenated vegetable oils for shortenings of animal origin, the lard situation has become serious from the standpoint of both the pork packer and the swine producer. Off-hand, three solutions to this problem present themselves: (1) Decrease hog production; (2) increase lard exports; or (3) increase domestic lard consumption.

It is impossible to decrease hog production materially if we supply the demands of our own people for pork. And since there seems to be no prospect of much increase in lard exports for some time, the disposition of the lard surplus in domestic consumption is the only alternative left. This solution seems reasonable, especially since lard supplies only about half of our shortening requirements. The big obstacle to increased domestic lard consumption is the fact that much of our lard lacks stability, that is, it soon becomes rancid, as compared with the hydrogenated vegetable oils with which it must compete.

Several years ago the Agricultural Experiment Station of the University of Illinois began experimenting with antioxidants in the preservation of fat meats and lard. In these experiments it was borne in mind that the antioxidant used must not only retard the development of rancidity but it also must be cheap and harmless to health.

The Musher Foundation[1] has reported that the addition of sugars to pork fat and to fish waste before rendering inhibited the development of rancidity. Hence, dextrose, or corn sugar, was used in some of our experiments. The experiments were all made with kettle-rendered lard in a small steam-jacketed kettle. Five to 20 lb. of fat was used in each rendering. Most samples were rendered at a 30-lb. steam pressure for three hours. Since there is considerable variation in the fat of different hogs and in the fat from different parts of the body of the same hog, the fat backs of the same hog were used in each test. The fat was cut into small cubes. The dextrose was dissolved in a small amount of water (usually 200 c.c. for a 5-lb. sample) and added to the fat immediately after it had been placed in the steam kettle. In each test a check sample was rendered.

After rendering, the hot lard was drawn off, strained through cheesecloth and cooled in the refrigerator. The Swift stability apparatus was used as a measure of the keeping qualities of the lard. This apparatus, developed in the laboratories of Swift & Co., is used extensively in predicting the keeping quality of lard. It accelerates the development of rancidity by bubbling air through the hot fat under standard conditions. The operator smells the samples from time to time to detect rancidity. The peroxide numbers of the samples are then determined as a further check. A peroxide number of 20 or higher usually accompanies rancidity in lard. Obviously, a lard which requires a long time in the stability apparatus before it becomes rancid will keep better under normal storage conditions.

[1] U.S. Patent No. 2,198,211.

**Table I—Effect of Dextrose Upon Stability of Unbleached Lard.**

| Sample | Dextrose (percent) | Stability (hours) | Sample | Dextrose (percent) | Stability (hours) |
|---|---|---|---|---|---|
| 69 | 0 | 1 | 121 | 0 | 1 |
| 71 | 2.0[1] | 3 | 122 | 0.5 | 7 |
| 81 | 0 | 1 | 123 | 1.0 | 3 |
| 84 | 2.0[1] | 2 | 124 | 1.5 | 6 |
| 85 | 0 | 1 | 125 | 0 | 1 |
| 88 | 2.0[1] | 2 | 126 | 0.5 | 4 |
| 89 | 0 | 2 | 127 | 1.0 | 4 |
| 90 | 1.0 | 6 | 130 | 0 | 2 |
| 91 | 2.0 | 6 | 131 | 0.5 | 7 |
| 93 | 0 | 1 | 132 | 0 | 3 |
| 94 | 1.0 | 6 | 133 | 0.5 | 7 |
| 95 | 1.0[2] | 5 | 134 | 0 | 3 |
| 96 | 2.0 | 2 | 135 | 0.5 | 6 |
| 101 | 1.0 | 4 | 137 | 0.5 | 5 |
| 102 | 2.0 | 6 | 138 | 0 | 3 |
| 103 | 1.0[2] | 3 | 139 | 0.5 | 5 |
| 104 | 2.0 | 5 | 141 | 0 | 3 |
| 105 | 0 | 1 | 140 | 0.25 | 6 |
| 106 | 1.0 | 7 | 143 | 0 | 3 |
| 107 | 0.5 | 6 | 142 | 0.25 | 5 |
| 109 | 0 | 1 | 144 | 0 | 1 |
| 110 | 1.0 | 3 | 146 | 0.25 | 3 |
| 111 | 0.5 | 2 | 147 | 0 | 3 |
| 113 | 0 | 2 | 148 | 0.25 | 5 |
| 114 | 1.0 | 10 | 149 | 0 | 3 |
| 115 | 2.0 | 8 | 150 | 0.5 | 8 |
| 116 | 0.25 | 8 | | | |
| 117 | 0 | 1 | | | |
| 118 | 1.5 | 3 | | | |
| 120 | 1.5[3] | 5 | | | |

[1] *No water added.*
[2] *Corn sirup used.*
[3] *"Sweetose" used.*

**Table II—Effect of Dextrose Upon Stability of Bleached Lard.**

| Sample | Dextrose (per cent) | Fuller's earth (per cent) | Stability (hours) | Sample | Dextrose (per cent) | Fuller's earth (per cent) | Stability (hours) |
|---|---|---|---|---|---|---|---|
| 93 | 0 | 0 | 1 | 120b | 1.5 | 1.0 | 2 |
| 94 | 1.0 | 0 | 6 | 120c | 1.5 | 1.5 | 2 |
| 94a | 1.0 | 2 | 3 | 121 | 0 | 0 | 1 |
| 102 | 2.0 | 0 | 4 | 122 | 0.5 | 0 | 7 |
| 102b | 2.0 | 1 | 3 | 122a | 0.5 | 0.5 | 5 |
| 95 | 1.0 | 0 | 5 | 122b | 0.5 | 1.0 | 4 |
| 95a | 1.0 | 1 | 2 | 125 | 0 | 0 | 1 |
| 95b | 1.0 | 1 | 4 | 126 | 0.5 | 0 | 7 |
| 105 | 0 | 0 | 1 | 126b | 0.5 | 0.5 | 7 |
| 106 | 1.0 | 0 | 7 | 126c | 0.5 | 1 | 6 |
| 106a | 1.0 | 1 | 6 | 130 | 0 | 0 | 2 |
| 106b | 1.0 | 0.5 | 6 | 131 | 0.5 | 0 | 7 |
| 106c | 1.0 | 1 | 7 | 131b | 0.5 | 0.5 | 4 |
| 106d | 1.0 | 0.5 | 4 | 132 | 0 | 0 | 3 |
| 113 | 0 | 0 | 2 | 133 | 0.5 | 0 | 7 |
| 114 | 1.0 | 0 | 10 | 133a | 0.5 | 0.5 | 5 |
| 114a | 1.0 | 0.5 | 5 | 134 | 0 | 0 | 3 |
| 114b | 1.0 | 1 | 4 | 135 | 0.5 | 0 | 6 |
| 114c | 1.0 | 1.5 | 3 | 135a | 0.5 | 0.5 | 2 |
| 117 | 0 | 0 | 1 | 149 | 0 | 0 | 3 |
| 120 | 1.5 | 0 | 5 | 150 | 0.5 | 0 | 8 |
| 120a | 1.5 | 0.5 | 3 | 150a | 0.5 | 1 | 5 |

The stabilities of 56 lard samples, 20 kettle-rendered with no dextrose added and 36 kettle-rendered with varying amounts of dextrose added, are given in Table I. It is noted that the addition of dextrose materially increased the stability of the lard in every case. There seemed to be no advantage in using more than 0.5 percent dextrose, and 0.25 percent dextrose seemed to give nearly as good results as 0.5 percent. In general, the sugar-rendered lard was two to three times as stable as the check samples of lard.

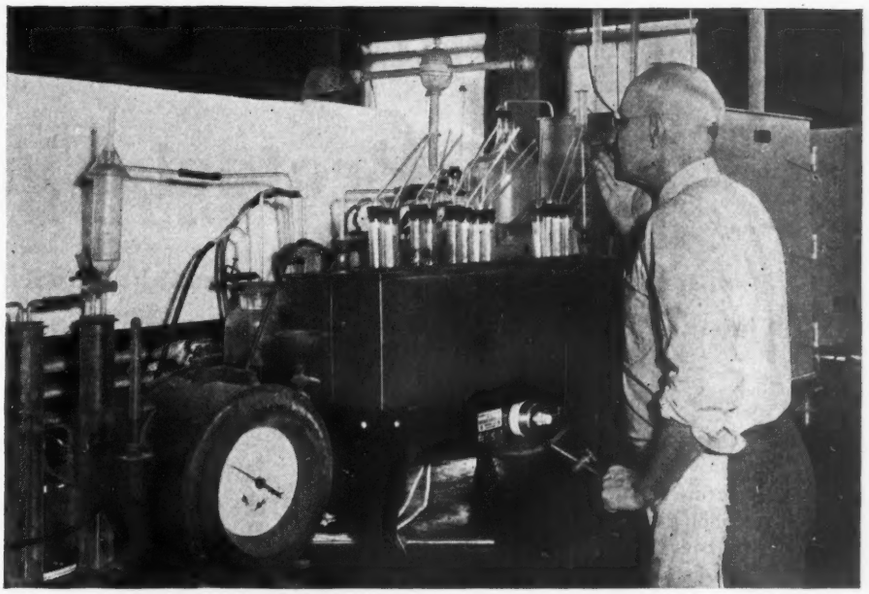
We do not have laboratory facilities for making steam-rendered lard. Hence we arranged with a meat packer to render a tank of lard with 0.5 percent dextrose added to the fat. The sugar-rendered lard had a stability of 13 hours as compared with 4 hours for the check sample. These figures were verified by a commercial laboratory.

Sugar-rendered lard is slightly dark, but no darker than much unrefined lard on the market. Hence, 22 samples of the sugar-rendered lard were bleached with fuller's earth and filtered. The stabilities of the bleached samples are given in Table II. For convenience, the stabilities of the corresponding check sample and the unbleached sugar-rendered samples are also included.

In all except two samples (106c and 126b), the stability was reduced by bleaching. In every case except one (135a), however, the bleached, sugar-rendered sample had a much greater stability than the comparable sample rendered without dextrose. The bleached samples had the characteristic white color of refined lard. They also had a slightly different odor and flavor from either the check or the unbleached sugar-rendered samples. The check samples had a slight pork odor and flavor characteristic of unbleached lard. The unbleached sugar-rendered lards had a slight odor and flavor of caramel which masked the pork odor and taste. The clarification by fuller's earth added a slight earthy odor and flavor.

Many housewives object to the odor and flavor of lard, especially the refined lard. This is particularly true of those who are accustomed to the use of bland (that is, flavorless and odorless) hydrogenated vegetable shortenings. In order to determine if the flavors of the experimental lards were objectionable, palatability tests with cakes were made under the direction of the Department of Home Economics.

In the first test, partially hydrogenated, bland, packer-made lard, U. of I. check lard, U. of I. sugar-rendered lard and U. of I. bleached sugar-rendered lard were used under code numbers. Cakes were mixed by machine according to a standard recipe, using no flavoring material. All cakes were scored by 15 staff members and advanced students of the Home Economics Department using a score card prepared by the U. S. Department of Agriculture[1]. The judges rated the cakes as follows: 1st, bland lard; 2d and 3d (tie), bleached sugar-rendered and check lards; and 4th, unbleached sugar-rendered lard.



**Testing the keeping quality of sugar-rendered lard with the Swift stability apparatus. Sugar rendering was found to extend the stability of lard two to three times.**

Since freedom from lard flavor in a cake is important to most people, a separate score card was prepared to cover this point.

The judges decided that the bland lard ranked first; the unbleached, sugar-rendered lard, second; the check lard, third; and the bleached, sugar-rendered lard, fourth in this respect.

The second test was a duplicate of the first except the ingredients of the cakes were hand mixed instead of machine mixed. The cakes were scored by the same judges and rated as follows: 1st, bleached sugar-rendered; 2d, unbleached sugar-rendered; 3d, bland; and 4th, check. In freedom from lard flavor, unbleached sugar-rendered lard cake was first; the bland lard cake was second; the bleached sugar-rendered lard cake was third; and the check lard cake was fourth.

In the third test, two cakes were made from the bland lard used in the other tests, two from another sample of bleached, sugar-rendered lard and two from a packer-rendered, refined steam lard purchased on the market. The ingredients were hand mixed. The cakes were rated by 12 judges as follows: 1st, one of the bleached sugar-rendered cakes; 2d, one of the cakes made with bland lard; 3d, the other cake made from bleached sugar-rendered lard; 4th a cake made with refined steam lard; 5th, the other cake made with bland lard; and 6th, the second cake made with refined steam lard.

In freedom from lard flavor, the two cakes made with bland lard were rated 1st and 2d; the two cakes made from bleached sugar-rendered lard, 3d and 4th; and the two cakes made with refined steam lard, 5th and 6th.

A study of the use of lards and hydrogenated vegetable fats in pastry was made by Miss Helen Bittermann, a senior home economics student using the bland, partially hydrogenated lard previously referred to, a hydrogenated vegetable shortening, U. of I. check lard and bleached sugar-rendered lard. Pie crusts were made with different amounts of the above shortenings. She arrived at the following conclusion:

"All of the crusts made with the standard amount of fat (66 gm.) showed marked tenderness and flakiness, and had well-blended flavors. The special (*i.e.*, bleached sugar-rendered) and market (that is, untreated, check) lards had pleasingly mild flavors but tended to be slightly greasy. The crusts made with 60 gm. of market and special lard were probably the most desirable of the series. They were evenly browned, tender, flaky, pleasing in flavor and lacked the greasiness noted in the standard formula."

### *Summary*

The addition of small amounts of dextrose to pork fat during open steam-kettle rendering materially increased the

(*Turn to page 97*)

[1] U.S.D.A. Farmers' Bulletin No. 1775.

# Concentrating by Freezing To Protect Flavor

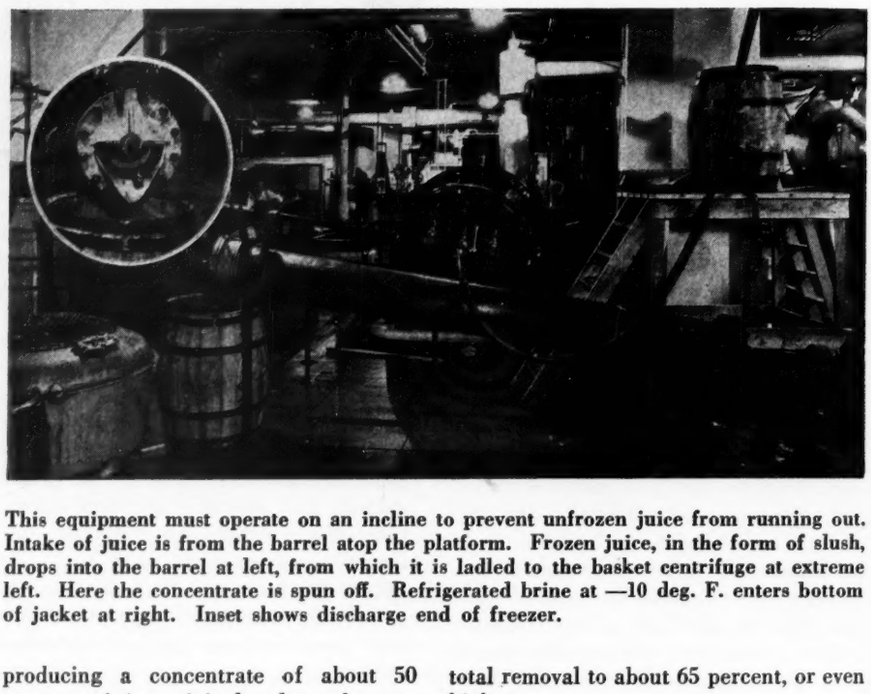
**Continuous freezer converts water in fruit juice to ice which is separated from juice by contrifuging. Method avoids damage to quality by high temperature**

CONTINUOUS concentration of a heat-sensitive solution without raising its temperature is a goal long sought by food technologists. To concentrate a solution, the solvent must be made to change its physical state so that it may be removed. One way is to convert it into a vapor by raising its temperature. The vapor escapes, leaving the original solution more concentrated, but unless an exceptionally high vacuum is employed, the boiling point of the solution can easily be high enough to injure the flavor of the liquid. Or worse yet, the actual boiling of the liquid may cause volatile flavor materials to escape along with the vapor, leaving a less flavorsome residual concentrate.

If reduced temperatures are used, the solvent can be partially frozen and removed from the solution by mechanical means. This principle depends on the fact that slow freezing of a solution (which must not be an eutectic mixture because an eutectic will not change its physical composition on freezing) will result in separation of crystals of the pure solvent. This method is the old fashioned method of concentrating hard cider to make applejack. Makers of artificial ice also employ this principle when they suck out the core of an ice cake to remove the impurities in the water which have been concentrated there.

While such freezing to concentrate a liquid is efficacious, it is a batch method and is deplorably slow. Some years ago Walter A. Zorn, of Cleveland, developed a machine for performing the same job in a continuous method. (See FOOD INDUSTRIES, May, 1933, page 129.) The method attracted world-wide attention, but as far as this study knows it has not yet been adopted for commercial production.

Another method of continuous concentration by continuous freezing is that of Wilpert A. Heyman, president of Heyman Process Corp., New York (U. S. Patent No. 1,641,429, dated September, 1927). At a recent demonstration it was operating on apple cider and producing a concentrate of about 50 percent of its original volume by one passage through the cycle. It has also been used to concentrate the juice of oranges and pineapples.



**This equipment must operate on an incline to prevent unfrozen juice from running out. Intake of juice is from the barrel atop the platform. Frozen juice, in the form of slush, drops into the barrel at left, from which it is ladled to the basket centrifuge at extreme left. Here the concentrate is spun off. Refrigerated brine at —10 deg. F. enters bottom of jacket at right. Inset shows discharge end of freezer.**

The apparatus consists of an inclined jacketed tube in which a helical worm (screw conveyor) rotates. The entire freezing equipment is made of aluminum and copper. Brine at —10 to —15 deg. F. is fed into the jacket at the low point and escapes at two different outlets on the top side of the jacket as shown in the illustration. By having these two adjustable outlets, the position of the actual freezing may be controlled. Juice to be concentrated enters the space between the worm and the jacket at the lowest point, and as it moves forward and upward it is frozen very slowly into the form of a slush at 25 deg. F. This slush is put into a perforated basket centrifugal, lined with a fine-mesh gauze. In this, the cencentrate is spun off, leaving a white, tasteless water ice amounting to about 50 percent of the input of juice.

A second passage through the cycle at a lower temperature will increase the total removal to about 65 percent, or even higher.

In this experimental unit, the tube is 16 ft. long and 14 in. in diameter. The worm rotates at 15 r.p.m. and moves material undergoing freezing from inlet to discharge point in 1 minute, a 2-hp. motor driving through a speed reducer furnishing the power.

In essence, this method of concentration depends on slow freezing as contrasted to quick freezing. Indeed, if the liquid were quick frozen there would be little separation of pure ice. Judging by the results of this demonstration it would appear that continuous freezing for concentration must always proceed with majestic slowness.

Nevertheless, this unit is said by its inventor to be able to handle an input of 100 gal. of fruit juice per hour, producing 50 gal of a double-strength concentrate.

Although the heat removal is entirely via the jacket, the ice has a tendency to adhere to the worm from which it must be occasionally scraped by a tool inserted into a longitudinal slot on the top side of the tube.

# Wetting Agents Speed Chemical Peeling

## Experiments with peaches show value of adding sulphonates to alkaline or acid peeling solutions

By IRVIN T. OLSEN, *Engineering Experiment Station, University of Tennessee, Knoxville, Tenn.*

IN the preparation of peaches for preservation by quick freezing, extreme care must always be taken to prevent any adverse changes taking place in appearance, flavor and color. The peach should be allowed to mature until fully ripened and then processed as soon after as possible, to prevent any deteriorations caused by overripeness and respiration. Ripe peaches have a soft, delicate flesh covered with a thin skin and will offer scarcely any resistance to pressure. The slightest bruise in handling will lower the sales value. The removal of the skin from ripe peaches and the prevention of discoloration of the peach prior to freezing, and thereafter, have been two of the most obstinate problems which have confronted the joint efforts of the freezing industry.

These two factors are largely responsible for the fact that the increase in the quantity of peaches being preserved by freezing is not as rapid as that enjoyed by some of the other fruits and vegetables. Although some materials are known that will stop, or inhibit, the browning of peaches, the use of most of these is prohibited because they will produce a deleterious effect on the fruit itself, will result in an off-flavor product, or will interfere with digestion when the fruit is eaten. Similarly, as yet no mechanical means have been devised which are satisfactory for peeling peaches. As a result a large majority of the peaches that are commercially processed are peeled by immersion in chemical solutions.

### *Present Methods of Peeling Peaches*

During the first years of the fruit canning industry, peaches were peeled by hand. At the present time, commercial canners do not peel the fruit in this manner but use instead the lye peeling method. The knife formerly used for the hand peeling of peaches has a curved blade with an adjustable guide, which permits regulation of the depth of peeling. The objection to hand peeling of peaches is that it is very much more costly than lye peeling and is more wasteful of fruit.

Another method of peeling peaches that was used earlier, but less extensively today, is known as steam peeling. In this method the peaches are halved and pitted and then placed on a conveyor belt which moves under jets of live steam. The action of the steam loosens the skins, which are then rubbed off by hand in cold water. The fruit is then allowed to pass through a water bath containing 0.5 percent of hydrochloric acid which arrests the action of the oxidase in the peach and prevents superficial discoloration. Higher concentrations of citric acid or brine solutions can be substituted for the hydrochloric acid.

The advantage of this method is that the peaches are pitted and halved before the skin is removed, which materially contributes to the prevention of bruising in handling. The disadvantage is that the heat necessary to remove the peel partially cooks the fruit and affects the taste.

A novel and unique method of removing the peel from peaches is that which was patented by Taylor[1] in 1937. This consists of freezing an outer shell of the peach to a depth slightly greater than the thickness of the skin and subsequently thawing the peach just through the skin. Since the peel is now loose and the flesh of the peach still hard, the peel can be removed by abrading without damage to the peach. The most attractive feature of this method is that no heat is added to the product. The disadvantage is that the thawing should not be allowed to continue past that required to loosen the peel—a condition hard to adjust.

According to Tressler and Evers,[2] the best treatise thus far reported on the peeling of peaches is that by Woodroof.[3] This method is known commonly as "lye peeling" and is used rather extensively at present in both freezing plants and canneries. The peaches are immersed in a 10 percent solution of sodium hydroxide, maintained at a temperature of 140 deg. F., for a period of from three to five minutes. The peel is then rubbed off, the fruit washed in cold running water, and then allowed to pass through a 2 percent citric acid solution, or 0.1 percent hydrochloric acid solution. The hydrochloric acid forms harmless sodium chloride (table salt) with the traces of residual lye on the fruit and inactivates the oxidase.

The advantages of lye peeling as compared to hand peeling are: (1) It reduces the cost of peeling, (2) it permits more rapid handling of the fruit, (3) it causes less loss of fruit by peeling. The disadvantages are: (1) Unless all of the lye is removed from the peach after peeling and the pH lowered to about 4.0, browning will take place while in storage; (2) if allowed to remain too long in the lye batch the flesh, after peeling, will become pitted and rough.

Thus, it is seen that all of the methods listed above are unfavorable in some respect for the peeling of peaches; the hand method is too costly and slow; steam peeling affects the flavor of peaches that are to be quick frozen; conditions favorable for peeling by first freezing and then thawing are hard to adjust and maintain; and lye peeling is apt to cause browning of the peach during storage.

### *Acid Peeling*

Since all of the present methods have some disadvantage, it was decided to try peeling the peaches in an acid bath. During the season of 1939, all available varieties of peaches were peeled using various mineral and organic acids of varying strength. Also, solutions of

sodium hydroxide and potassium hydroxide were tried.

Of the acids used, hydrochloric and sulphuric seemed to be the most effective, the ineffectiveness of the organic acids being caused by their low degree of disassociation. There were no noticeable differences in the action of the alkalis, both reacting with the same degree of effectiveness. However, sodium hydroxide was given the preference over potassium hydroxide because of its cheapness in cost.

At the end of the experiment the following conclusions were reached:

1. Solutions of hydrochloric acid compare favorably with other methods for loosening the peel of peaches.

2. A 10 percent solution of hydrochloric acid, and a 10 percent solution of sodium hydroxide, augmented with a small amount of a neutral wetting-out agent gave the best results.

3. The results obtained in the laboratory relative to the prevention of oxidation in fruits containing catechol-tannins by the use of hydrogen chloride solutions were encouraging. The fruit peeled in the lye solutions showed much more discoloration than the fruit peeled in the acid bath, both being frozen and stored under the same conditions. The chloride ion may have exercised a bleaching effect upon the sliced peaches while, no doubt, the hydrogen ion inhibited the action of the oxidizing enzymes.

4. The loss of fruit through the process of removing the peel is less when acid is utilized for the purpose than the loss chargeable to other recognized methods.

5. The cost of the acid in removing the peels from peaches is relatively small.

With these conclusions in mind, it was decided to spend the available time this season on a study of the effect of various wetting-out agents on the rate of peeling peaches. Consequently, three of these compounds were obtained and peaches of the Elberta, Hale and Georgia Belle variety were used in the test.

### *Wetting Agents*

Early in the investigation it was noted that, when the peach was immersed in the acid bath and later removed, the skin was dry and still firm. This indicated that the acid solution was not attacking the peel and suggested the use of a wetting-out agent.

In selecting a surface-active agent, several characteristics were looked for. It should possess great stability to strong acids and alkalis, should be neutral in reaction, should be soluble, or miscible, to the extent of being effective, and should be non-toxic in character. Accordingly, the products of three manufacturers were selected and used in the tests.* These are alkyl aryl sulphonates —products of petroleum sulphonation. Their duty is to lower the interfacial tension between the solution and the product being processed, allowing complete and efficient wetting-out.

### *Determination of Peeling Time*

In order to determine accurately the length of time necessary for the peaches to be submerged in the various peeling solutions, so that they could be easily and completely peeled, some 10 or 12 peaches of the same variety, and evenly matured, were introduced into the baths and removed each 15 seconds to test their ease of peeling. Peeling was accomplished by removing the peaches from the solution at various intervals of time and submerging them under running cold water, the peel being removed by rubbing the peach under water with hands covered with rubber gloves.

For example, in order to obtain the points on the hydrochloric acid curve in Fig. 1, a 2 percent hydrochloric acid solution was prepared containing 0.5 percent of a wetting-out agent, this solution being heated and maintained at 140 deg. F. A number of peaches were then added to the solution and after a lapse of time of two minutes, and thereafter at 15-second intervals a peach was removed and peeled. It was found that the peaches were easily and completely peeled after being in the bath from 4½ to 5½ minutes. Then another batch of fruit was placed in the bath and this time several peaches were removed at 15-second intervals, starting after a lapse of time of 4½ minutes.

It was now evident that the minimum length of time necessary for the fruit to be immersed in the bath to afford efficient and effective peeling was five minutes. Thus, the top point on the acid curve in Fig. 1 was located, and the identical procedure was used to find the other points on all the curves; the concentration of the solutions being increased from 2 to 5 and then 10 and 14 percent to obtain the curves in Fig. 1; the temperature being varied to locate the points for the curves on Fig. 2, and the concentration of the surface-active agent being changed to obtain the curves in Fig. 3.

(*Turn to page 97*)

* "Naconnol NR," manufactured by National Aniline & Chemical Co.
"MP 189", manufactured by E. I. duPont de Nemours & Co.
"Santomerse", manufactured by Monsanto Chemical Co.

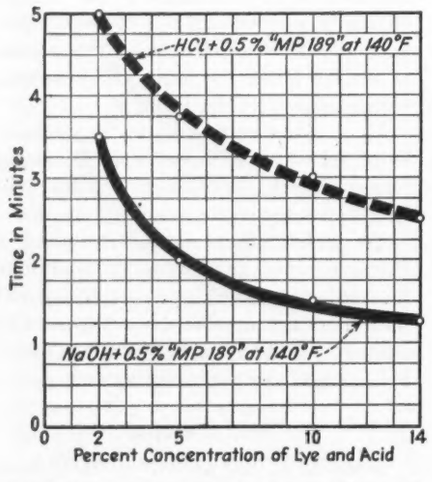



**Fig. 1. Time-concentration curve for peeling Georgia Belle peaches. In this experiment the temperature of the peeling solution and the percentage of added wetting agent were held constant, while the percentage of alkali or acid in the solutions was varied from 2 to 14 percent**

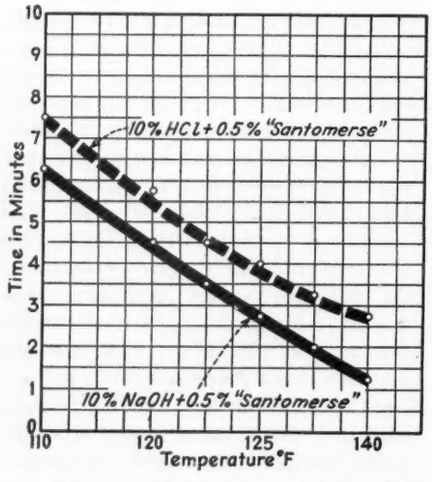



**Fig. 2. Time-temperature curve for peeling Hale peaches. In this experiment the percentage of acid or alkali and the percentage of wetting agent in the peeling solutions were held constant, while the temperature was varied from 110 to 140 deg. F.**

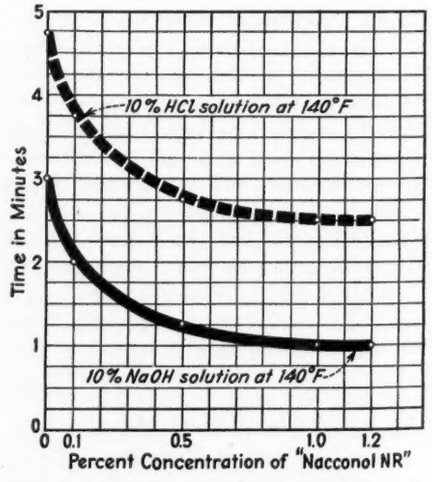



**Fig. 3. Time-concentration curve for peeling Elberta peaches. In this experiment the temperature and percentage of alkali or acid of the peeling solutions were held constant, while the percentage of added wetting agent in the solutions was varied from 0 to 1.2 percent**

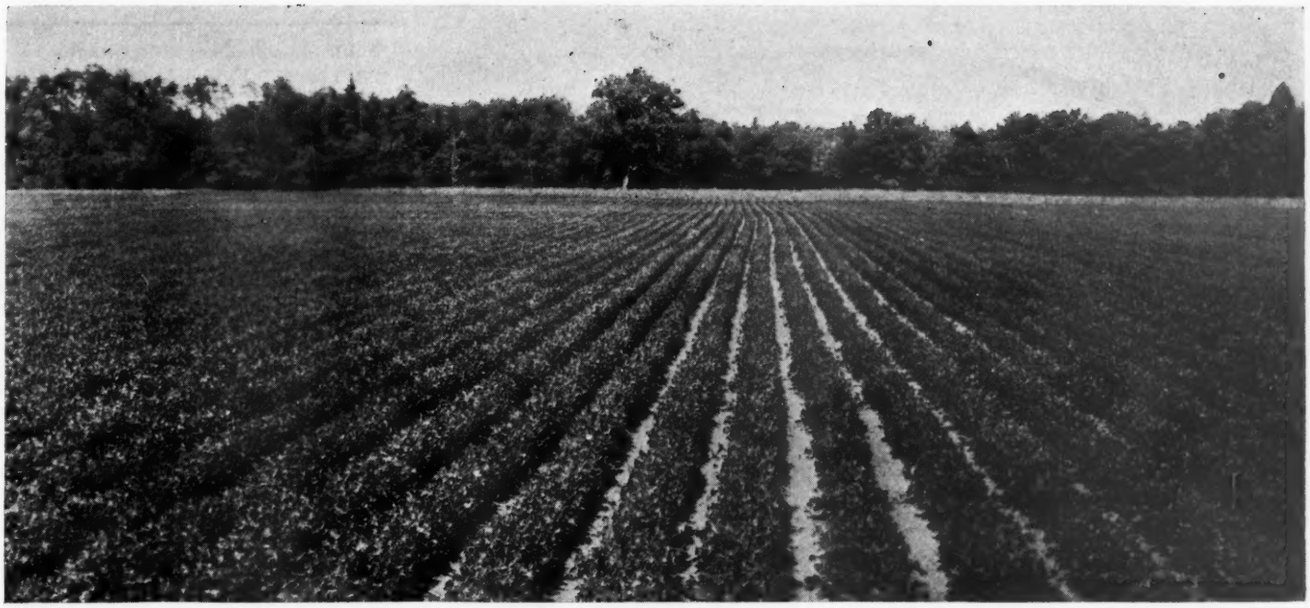


Fig. 1. A field of Henderson Bush lima beans growing in the Tennessee Valley for freezing.

# Factors That Affect Quality In Frozen Lima Beans

**Tests show speed in all operations important in maintaining quality. Other factors also influence. Cooking time needs label declaration ***

By J. G. WOODROOF, *Georgia Experiment Station*, and J. O. TANKERSLEY, *University of Tennessee*

LIMA BEANS are well suited to preservation by freezing. Among the vegetables, the tonnage frozen is second only to that of green peas. According to the Bureau of Agricultural Economics, there were more than 18,000,000 lb. of frozen lima beans in storage in October, 1939. The quantity in storage varies constantly due to steady withdrawals during the winter and restocking during the summer from several sections of the country. Thus frozen lima beans are definitely a staple, year-round food commodity.

While there are a few areas of this country that are peculiarly adapted to growing lima beans, the crop may be grown with considerable success in practically every state or section. It is one of the most universally liked among the vegetables and fits well into the frozen foods industry, whether it be large commercial production, production on a small scale, or freezing locker stores.

Lima beans are relatively easy to prepare and freeze. They are only slightly subject to oxidation, have no leakage on thawing, and maintain their structure remarkably well.[9] There are other factors which go to make up quality in the frozen product which are considered here; also a number of suggestions for attaining the highest quality.

The color of lima beans is a very important index of quality and must be maintained in order to be U. S. Grade A.[6] Factors affecting colors (blue, green, and yellow) have been given considerable study by us and they were found to be in a state of constant change. Before shelling, blue—the most desirable color—begins to fade, followed by green; shelling and exposure to air accentuate the change. Blanching intensifies all colors present, but they begin to fade again upon exposure to air. Freezing in brine or glycerine intensifies colors slightly but on prolonged storage they fade again. A delay in cooking after thawing results in loss of color, likewise a delay in serving after cooking.

The key to success in maintaining quality in frozen lima beans is *speed* in every operation, and a temperature of 0 deg. F. or below during freezing and storage.

These studies stress the necessity for a thorough knowledge not only of varieties but of the most suitable stage for harvesting, and specific methods of handling throughout.

* This study was conducted cooperatively with the Tennessee Valley Authority.

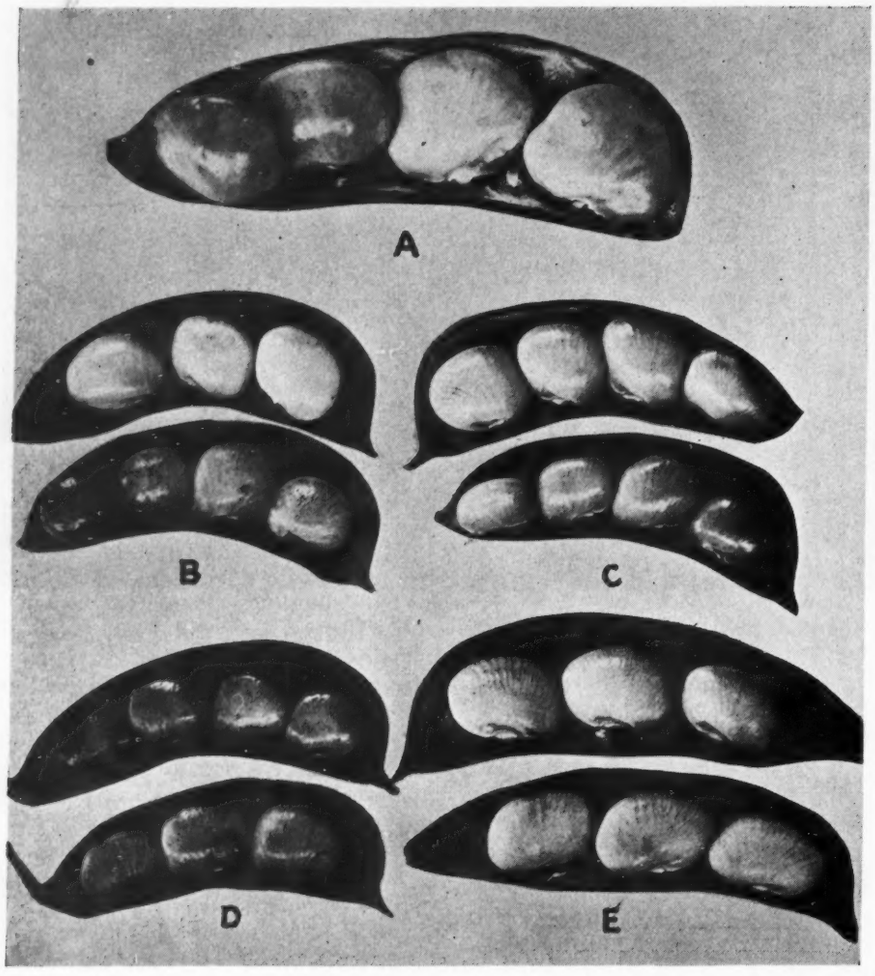



**Fig. 2. Varieties of lima beans for freezing: A, Fordhook Bush; B, Baby Potato; C, Baby Fordhook; D, Early Baby Potato; E, Henderson Bush.**

### *Shelling Methods*

There are two methods of shelling lima beans. One is with the use of a "viner" that threshes the beans from the vines in the field after they are cut. This is especially suitable for small beans, as Henderson Bush or Baby Potato varieties. The other is with the use of a "huller" that threshes the beans from the hulls after being hand-picked, and is adapted especially to the large Fordhook variety. In either case the beans are likely to be bruised and many of the seed coats broken, especially if the machinery is run too fast. This bruising increases enzymatic activity, causing more rapid heating with increased loss of fresh flavor, color and aroma. Bruised beans also absorb brine or other soluble materials with which they come in contact during grading, blanching, or freezing.

Shelling percentages were determined on 28 lots of hand picked lima beans of five varieties, as shown in Table I. The more mature the beans the lower will be the percentage of hulls and higher the percentage of white beans.

Figure 2 shows the relative size and characteristics of these varieties and Fig. 3 shows the relative bulkiness of the shelled beans as compared with the empty hulls. Time of harvesting is important, as harvesting too early results in an excess of immature beans and waiting a day too late causes too many white beans.

Shelling should be done immediately after the vines are cut or the beans are picked, in order to retain maximum color in the beans. After shelling they are handled in lugs (see Fig. 4), with the beans 5 or 6 in. deep.

Freshly threshed beans heat very quickly and when placed in a heap, they become slightly warm within an hour. Tests showed that in 15 hours the temperature had risen to 110 deg. F., at which time they had developed a brown coloration, were slick and sticky with fungus growth, had an objectionable odor and flavor, and were unsuited for food. A temperature above 100 deg. F. is objectionable, which means that when the standard lugs are filled to the usual 6 in. six or seven hours is the maximum time to permit between shelling and blanching. If they are to be held for more than two hours, it is definitely advantageous to avoid filling the lugs or

**Table I—Shelling Percentages on 28 Lots of Green Lima Beans of Five Varieties.**

| Variety | Hulls | | |
|---|---|---|---|
| | Highest percent | Lowest percent | Average percent |
| Henderson Bush..... | 72 | 55 | 61 |
| Fordhook Bush..... | 66 | 60 | 63 |
| Baby Fordhook..... | 70 | 51 | 61 |
| Baby Potato..... | 71 | 50 | 61 |
| Early Baby Potato... | 72 | 50 | 61 |

else to spray with cold water at three-hour intervals.

When lugs were closely stacked or the pile was more than 6 in. deep, refrigeration was of little or no benefit. This was apparently due to the slow removal of heat from inside the pile of beans.

Repeated wetting with cold water (once every three hours) was of decided benefit. When this was done, the temperature did not rise above 86 deg. F. in 15 hours. Without wetting, beans stayed fresh only six or seven hours, while those that were wetted three times stayed fresh ten or eleven hours, or almost twice as long. Wetting at one or two-hour intervals was of no advantage over wetting at three-hour intervals; and wetting at four or five-hour intervals did not keep the beans cool.

### *Blanching Operations*

Blanching in steam or boiling water for two to three minutes (depending on the size of beans) to inhibit the activity of enzymes, is a common practice for which no practical substitute has been found. The treatment inactivates enzymes and produces a much more highly colored product. Blue and green are greatly increased in "green" beans and yellow is intensified in "white" beans. As the distinction between the two types of beans is much more pronounced after blanching, it is best to blanch before hand-grading.

Satisfactory hot water and steam blanchers are on the market in several sizes. We are conducting researches on new methods of blanching.

After blanching and grading, beans should be frozen as quickly as possible. Without checking the effect on vitamins, Morris and Barker[3,4,5] found blanching in boiling water for one minute adequate for peas, while one minute with steam was inadequate to destroy enzymes. Steam-blanched peas were inferior in color to water-blanched peas, after storage in the frozen state and cooking, a difference which became more pronounced as the period of blanching was increased.

They stated that the effect of adding small quantities of sodium bicarbonate in blanching water or thereafter, improved the color of peas, prevented toughening of the skins, eliminated

Fig. 3. Two pounds of Henderson Bush lima beans together with the 61 percent of hulls that came from them.

**Table II—Showing Effects of Method of Freezing and Growing Conditions on Time Required to Cook Lima Beans, and on Color of Cooked Beans.**

| Method of freezing | Growing conditions | Cooking time (minutes) | Color[1] Blue | Green | Yellow | Taste |
|---|---|---|---|---|---|---|
| Unfrozen | Very good | 15 | ++ | +++ | + | |
| Sharp frozen 0°F | Very good | 12 | ++ | ++ | + | |
| On metal plate 0°F | Very good | 12 | ++ | +++ | + | |
| Immersion, 25% brine, 0°F | Very good | 12 | +++ | +++ | + | Slightly too salty |
| Unfrozen | Good | 23 | ++ | +++ | + | |
| On metal plate | Good | 22 | ++ | +++ | + | |
| Immersion, 25% brine | Good | 22 | +++ | ++++ | + | Slightly too salty |
| Immersion, 22.5% brine, 4.5% glycerine | Good | 22 | ++ | ++++ | + | Salt about right |
| Immersion, 17.5% brine, 13.5% glycerine | Good | 22 | ++ | ++++ | + | Slightly salty |
| Immersion, 12.5% brine, 22.5% glycerine | Good | 23 | ++ | ++++ | ++ | Very slightly salty |
| Immersion, 7.5% brine, 31.5% glycerine | Good | 23 | ++ | +++ | ++ | No salt |
| Immersion, 2.5% brine, 40.5% glycerine | Good | 23 | ++ | +++ | ++ | No salt, no sweetness |
| Unfrozen | Fair | 26 | ++ | +++ | + | |
| Sharp frozen | Fair | 26 | + | +++ | ++ | |
| Immersion, 25% brine | Fair | 23 | +++ | ++++ | + | |
| On dry ice | Fair | 23 | +++ | +++ | + | |
| Unfrozen | Dry | 32 | ++ | +++ | + | |
| Sharp frozen | Dry | 30 | ++ | ++ | + | |
| On metal plate | Dry | 30 | ++ | ++ | ++ | |
| Immersion, 25% brine | Dry | 30 | +++ | +++ | + | |
| On dry ice | Dry | 30 | + | ++ | +++ | |
| Unfrozen | Very dry | 37 | ++ | +++ | + | |
| Sharp frozen | Very dry | 33 | ++ | ++ | ++ | |
| On metal plate | Very dry | 33 | ++ | ++ | ++ | |
| Immersion, 25% brine | Very dry | 36 | ++ | ++++ | + | |
| On dry ice | Very dry | 32 | ++ | ++ | +++ | |

[1] Number of crosses (+) indicates relative intensity of color.

wrinkling on cooking, and improved the flavor.

They also obtained best results by blanching for one minute in boiling water containing 0.15 percent sodium bicarbonate and using a solution of the same strength as a covering liquor. Good results were also obtained by blanching in plain water for one minute and increasing the strength of carbonate in the covering liquor to 0.2 percent. With a longer period of blanching (three minutes) it was necessary to reduce the strength of the carbonate to 0.1 percent if added to both the blanching and covering liquors, but if added only to the covering liquor, a 0.2 percent solution was again required. Peas absorbed soda and weakened the solution. Addition of 1¼ oz. and 1¾ oz. soda per 28 lb. of peas was found to maintain a soda strength of 0.05 and 0.1 percent, respectively. One-fourth pound of soda in 25 gal. of water makes about a 0.1 percent solution.

Blanching in alkaline water has certain organoleptic advantages and improves the appearance but cannot be recommended because of its known adverse effects on vitamin C.[1,2,7]

### *Factors in Grading*

In order to be U. S. Grade A frozen lima beans, they must contain only 3 percent or less of "white" beans.[6] This requires very close grading and may be done by the brine separation method in which brine is made of a certain strength (about 13 percent) and floats green beans while the white beans sink. Our results show that this is only partially dependable and must be supplemented by hand-picking. Of 45,313 lb. run through our experimental plant, 11 percent were white as they came from the field. This required the separation and discarding of nearly 5,000 lb. of white beans. The white beans should be canned rather than frozen.

The percentage of white beans is based on number but since white beans are larger and weigh slightly more than twice as much as green beans, the percentage based on weight would be more than twice as high.

Delay in handling unshelled lima beans caused serious loss in color. A delay of six hours caused a noticeable loss in blue color and in 24 hours a total loss of blue color. The loss of green color was constant but not so pronounced. In 48 hours practically all of the blue and green colors were lost, leaving only the yellow which had increased since the time of harvest. Two days after picking all the beans were white, regardless of the stage of maturity at the time of picking. Storing under refrigeration drastically reduced the rate but did not prevent them from turning white.

Freezing alters the eating qualities of

**Table III—Showing Influence of Method of Freezing on Cloudiness and Amount of Suspended Matter (Starch) in Lima Bean Liquor After Cooking.**

| Method of freezing | Cloudiness of liquor[1] | Texture of beans | Suspended matter per lb. of cooked beans (grams) |
|---|---|---|---|
| Unfrozen | + | quite firm | 1.27 |
| Sharp frozen, 0 deg. F | +++ | mushy | 3.45 |
| On metal plate, 0 deg. F | ++ | mealy | 2.17 |
| Immersion, 25% brine, 0 deg. F | + | quite firm | 1.37 |
| On dry ice | ++ | firm | .... |

[1] Number of crosses (+) indicate relative degree of cloudiness.

Fig. 4. Two lugs used for handling shelled lima beans. That with the wire bottom and cleats is preferable, as it is lighter, provides ventilation and provides drainage when beans are wetted to keep them cool.

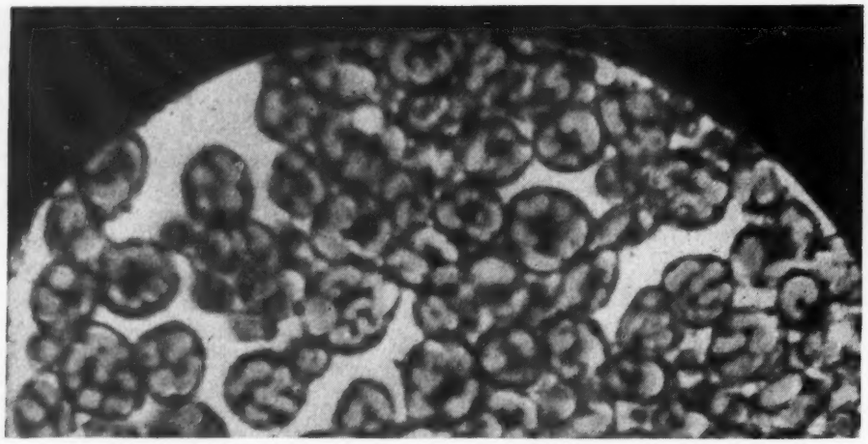


**Fig. 5. A highly magnified section of a lima bean showing how it is filled with starch grains. These give the bean firmness, act as a sponge in releasing and reabsorbing water on freezing and thawing, and may be washed into the liquor to cause cloudiness on cooking.**

lima beans as little as that of any product we have studied, either fruit or vegetable. Starch grains either give up water on freezing or reabsorb it on thawing, with little change. This accounts for the lack of leakage of lima beans on thawing, with consequent retention of vitamins and minerals (see Fig. 5).

Table II shows that the method of freezing influences the color of lima beans. Those sharp-frozen with maximum exposure to air during freezing lost much blue and some green color; likewise those frozen in direct contact with dry ice were bleached. Beans frozen by immersion in brine, glycerine, or a mixture of brine and glycerine were slightly more highly colored than unfrozen beans.

The time of cooking lima beans is reduced about 10 percent by freezing, otherwise they are comparable with fresh, unfrozen beans in taste and color. However, when held in storage for a year or more, without being heavily glazed, they lose both blue and green colors, and to this extent become unlike the fresh, unfrozen product.

Table III shows the effect of methods of freezing on texture of beans, and cloudiness and amount of suspended matter in the liquor after cooking. Sharp or slow-frozen beans became more mushy, and the liquor was more cloudy with a greater amount of suspended matter, than beans frozen more quickly either by immersion or with dry ice.

### *Summary*

Lima beans are easy to grow, simple to freeze, and rank second in tonnage among frozen vegetables.

Shelling, grading, blanching and freezing should follow in succession as rapidly as possible, in order to have maximum color, flavor, and nutritional value. Freezing should be completed within six hours after harvesting.

During various steps of processing, lima beans assume many shades of blue, green and yellow; the first two are desirable, the last is not. The more delay in processing, the more the loss of desirable colors. Either blanching, freezing, or cooking in an alkaline medium intensifies color, accentuates flavor and aroma, and reduces the time of cooking, but likewise destroys vitamins and therefore cannot be recommended. Copper in solution intensifies color and also destroys vitamin C. Sodium chloride slightly increases color and palatability. Salts of iron, zinc and aluminum are detrimental to desirable colors.

Freezing reduces the time of cooking lima beans about 10 percent.

Weight and bulkiness of frozen lima beans are increased about 10 percent after being cooked.

The season and growing conditions of lima beans tremendously influence the time required to cook them. For three years beans grown during very dry weather required more than three times as long to cook as those grown under very favorable conditions. Between these two extremes may be found beans that will cook anywhere from 15 to 45 minutes. It is impossible to properly label frozen lima beans in reference to cooking unless the growing conditions are considered. Where the growing conditions vary, labeling should be different.

Vollhase[8] found that greenness in vegetables may be influenced by climate, soil, ripeness, alkalinity or acidity, presence of metals (copper), and added vegetable dyes. Copper may be present in natural protein complex, as added copper salts or from copper equipment, and is very destructive to vitamin C.

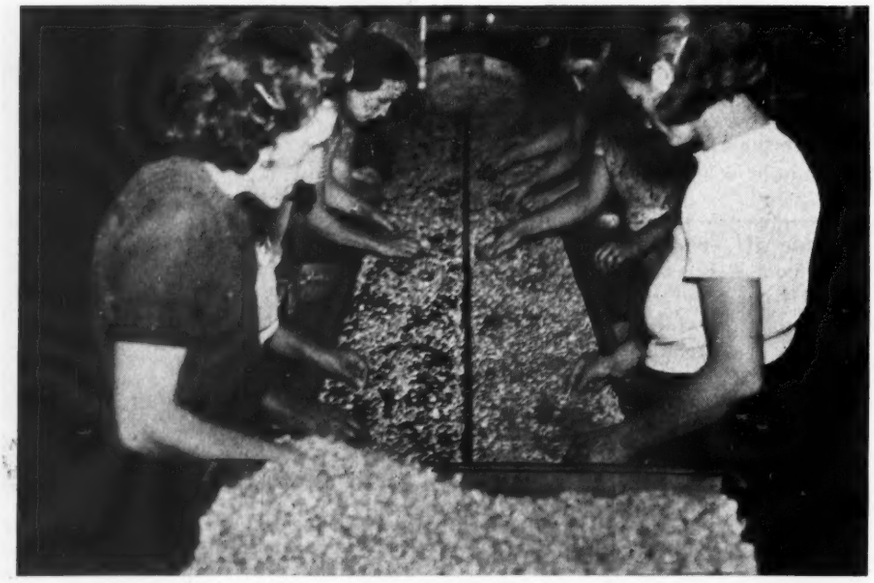


**Fig. 6. In addition to grading in a quality grader, it is necessary that lima beans be inspected and graded by hand to remove white and off-colored beans.**

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# Nitrate Kills Odor in Waste

**Protection against odor formation in cannery wastes (carbohydrate wastes) obtained by adding sodium nitrate to satisfy part of biochemical oxygen demand**

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STUDIES on the nitrate treatment of lagooned cannery wastes were not undertaken as the development of a new method for treating cannery wastes but rather as a corrective measure for those lagoons now in existence which are so located as to produce an odor nuisance. Further experiments may justify its use as a permanent treatment method or, more likely, permit the use of existing lagoons until such a time as other methods may be improved and shown to be completely satisfactory.

The ability of nitrates to prevent putrescence in domestic sewage was recognized as far back as 1892. Considerable work was done along this line until the development of biological filters provided a more satisfactory and economical sewage treatment method. More recently nitrates were used to correct offensive odor conditions due to anaerobic decomposition of industrial wastes during warm weather in the Naponset River in Massachusetts [1] and Coney Island Creek in New York.[2]

It is well known that organic matter in solution rapidly depletes the water of its oxygen content. When this condition is obtained the organic matter undergoes anaerobic decomposition with the production of offensive odors. By supplying an available source of oxygen the organic matter may be made to decompose without odor formation. Nitrates furnish such a supply of oxygen, and it is upon this basis that they may be used to control odor formation. To supply sufficient nitrate oxygen to completely satisfy all of the ultimate oxygen demand of cannery waste would be prohibitive in cost.

Laboratory studies were conducted on the effect of sodium nitrate in preventing objectionable odor development in pea, corn and tomato wastes. These tests were made in large, loosely covered beakers containing the waste to which varying amounts of sodium nitrate were added. All samples were inoculated with soil organisms by the addition of a small amount of soil. These were held for a period of time during which observations were made on odor, pH and strength of waste as measured by the biochemical oxygen demand and oxygen-consumed tests. Since cannery wastes are essentially carhohydrate wastes, it was not surprising to find that the three different wastes studied acted very much alike.

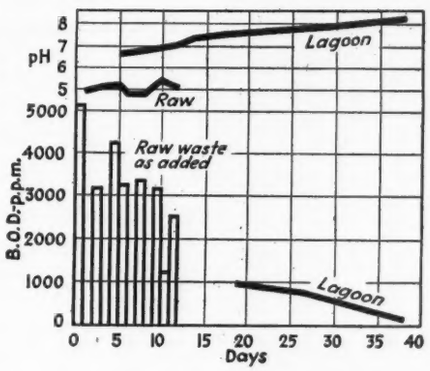



**Fig. 1. Showing 5-day B.O.D. and pH of raw pea waste as added to lagoon and B.O.D. and pH changes in lagoon after treatment with sodium nitrate at 40 percent dosage rate.**

The addition of sufficient sodium nitrate to furnish enough available oxygen to satisfy 50 percent of the 5-day B.O.D. gave complete protection against odor formation. A reduction of the nitrate dosage to a 40 percent level gave a treatment producing only a slight amount of a stale or musty odor during part of the holding period. Increasing odor accompanied decreasing nitrate dosages.

As a typical example of the results obtained, pea waste having an initial 5-day B.O.D. of 1,430 p.p.m. and treated at the 50 percent dosage rate had a residual B.O.D. of only 85 p.p.m. after a seven-week holding period, a reduction of 94 percent. A corresponding reduction was obtained by the oxygen-consumed test. The initial pH of the pea waste was 6.7. After one week this had dropped to 5.3 but rose rapidly to 8.7 by the end of the third week. The dissolved oxygen at the end of the seven-week holding period was 3 p.p.m.

Data obtained on these laboratory tests are given in Tables I, II and III. As shown in these tables, cannery wastes

**Table I—Nitrate Treatment of Pea Waste**

| Storage period | Effect of addition of sodium nitrate to satisfy specified percentages of 5-day B. O. D. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% |
| | p.p.m. | p.p.m. | p.p.m. | p.p.m. | p.p.m. | p.p.m. | p.p.m. | p.p.m. | p.p.m |
| **5-day B. O. D. (initial 1,430)** | | | | | | | | | |
| 1 week | 1,360 | 1,500 | 1,600 | 1,600 | 1,580 | 1,685 | 1,645 | 1,750 | 1,740 |
| 2 weeks | 242 | 514 | 638 | 544 | 702 | 456 | 286 | 512 | 215 |
| 4 weeks | 209 | 203 | 196 | 213 | ..... | ..... | ..... | ..... | ..... |
| 5 weeks | 185 | 227 | 201 | 232 | 227 | 209 | 217 | 220 | 140 |
| 7 weeks | 116 | 80 | 86 | 114 | 97 | 85 | 84 | 91 | 65 |
| **Oxygen consumed* (initial 2,900)** | | | | | | | | | |
| 1 week | 800 | 800 | 1,600 | 900 | 2,650 | 1,400 | 1,550 | 1,300 | 1,550 |
| 2 weeks | 450 | 450 | 375 | 350 | 525 | 325 | 275 | 275 | 225 |
| 3 weeks | 260 | 280 | 300 | 300 | 380 | 320 | 320 | 320 | 260 |
| 4 weeks | 190 | 210 | 235 | 215 | 255 | 220 | 235 | 225 | 235 |
| 5 weeks | 185 | 200 | 190 | 195 | 205 | 170 | 215 | 185 | 200 |
| 7 weeks | 125 | 200 | 150 | 155 | 135 | 125 | 155 | 140 | 215 |
| **pH (initial 6.7)** | pH | pH | pH | pH | pH | pH | pH | pH | pH |
| 1 week | 4.3 | 5.3 | 5.6 | 6.1 | 4.7 | 5.3 | 4.8 | 5.3 | 4.8 |
| 2 weeks | 6.8 | 7.3 | 7.2 | 7.9 | 6.4 | 7.6 | 7.7 | 7.7 | 8.2 |
| 3 weeks | 7.3 | 7.7 | 7.9 | 8.3 | 8.6 | 8.7 | 8.8 | 8.9 | 8.9 |
| 4 weeks | 7.8 | 8.2 | 8.3 | 8.6 | 8.7 | 8.8 | 8.8 | 8.8 | 8.7 |
| 5 weeks | 7.9 | 8.4 | 8.5 | 8.6 | 8.6 | 8.7 | 8.8 | 8.8 | 8.9 |
| 7 weeks | 7.8 | 8.3 | 8.6 | 8.6 | 8.6 | 8.8 | 8.8 | 8.8 | 9.0 |
| **Objectionable odor** | | | | | | | | | |
| 1 week | putrid | putrid | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 2 weeks | mod. | mod. | slight | mod. | ..... | ..... | ..... | ..... | ..... |
| 3 weeks | slight | $H_2S$ | putrid | mod. | slight | ..... | ..... | ..... | ..... |
| 4 weeks | slight | $H_2S$ | $H_2S$ | $H_2S$ | ..... | ..... | ..... | ..... | ..... |
| 5 weeks | slight | slight | slight | slight | ..... | ..... | ..... | ..... | ..... |
| 7 weeks | ..... | ..... | ..... | ..... | slight | ..... | ..... | ..... | ..... |

*Alternate method used. Permanganate 10 times stronger than normally used.

undergo a two-stage decomposition. This is more marked with pea and tomato than with corn waste. The initial period of greatest decomposition occurs during a relatively short period. It is during this period that the nitrate oxygen functions as a source of available oxygen for aerobic bacteria. The second stage of decomposition proceeds slowly over a longer period of time. During this second period natural aeration, growth of green algae and higher forms of animal life maintain conditions suitable for the odorless decomposition of the remaining organic material.

During the canning season three experimental lagoons were constructed and laboratory findings on the nitrate treatment were applied to field conditions. A composite of all the liquid waste incidental to the canning of peas, except cooling tank water, together with the stack juice from a very large pea stack and waste from a large dairy and cow barn, was delivered to the experimental lagoons. No separation of the wastes was possible. The combined wastes were acid, having an average pH value of 5.0, and were unusually high in organic matter, as shown by the average 5-day B.O.D. of 3,390 p.p.m. The wastes as pumped to the experimental lagoons had a strong initial odor due to the presence of silage juice and dairy wastes. Additions of waste to the lagoons were made on eight separate days. Somewhat less than the estimated amount of commercial sodium nitrate to satisfy 20, 30 and 40 percent of the 5-day B.O.D. was added on each of the eight days to the waste contained in the three separate lagoons. After determination of the actual B.O.D. of the waste added to the lagoon additional amounts of nitrate were added to give the desired degree of treatment.

Five weeks after the first addition of waste to the lagoons over 90 percent of the organic material was decomposed, with an increase in pH to 8.3. Data obtained with the 40 percent dosage rate are given in Fig. 1. The presence of the silage and cow odors which persisted for many days made it difficult to judge the normal development of characteristic odors from the pea waste itself. Subject to this complicating factor, the following conclusions were drawn: (1) It is not practical to treat pea waste containing silage juice; (2) at the 40 percent dosage rate satisfactory odor control is possible; (3) partial odor control, that is, elimination of the very strong butyric and putrid odors, is possible with the 30 percent dosage rate.

Similar lagoon treatment of corn waste containing cow waste was set up in the same lagoons after removal of the pea waste. Corn waste having a strong cow odor was treated with 30, 40, and 50 percent nitrate dosage rates. The entire volume of corn waste was added to the lagoons during a single day. Two weeks after treatment the wastes were no longer milky white in appearance. At the end of four weeks following a period of heavy rains the experiment was discontinued. No gassing or scum formation had occured. B.O.D. reductions varied from 66 to 76 percent, according to the dosage rate. No odor characteristic of anaerobic decomposition of corn waste was detected although a slight amount might have formed and been masked by the cow odor which remained to the end of the test.

For practical application of the nitrate treatment, it is necessary to know accurately the volume of waste and its strength.

The cost of nitrate treatment is high but compares favorably with the chemical or biological treatments when consideration is given to interest on the plant investment and depreciation of the last two methods of treatment. The average pea waste has a 5-day B.O.D. of

(*Turn to page 101*)

**Table II—Nitrate Treatment of Tomato Waste**

| Storage period | Effect of addition of sodium nitrate to satisfy specified percentages of 5-day B. O. D. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 0% | 7% | 14% | 20% | 27% | 34% | 40% | 49% | 55% |
| | p.p.m. | p.p.m. | p.p.m. | p.p.m. | p.p.m. | p.p.m. | p.p.m. | p.p.m. | p.p.m. |
| **5-day B. O. D. (initial 1,800)** | | | | | | | | | |
| 1 week | 880 | 940 | 1,080 | 1,020 | 960 | 1,040 | 900 | 890 | 920 |
| 2 weeks | 360 | 690 | 660 | 670 | 610 | 420 | 280 | 550 | ..... |
| 3 weeks | 270 | 365 | 285 | 380 | 395 | 250 | 245 | 265 | 255 |
| 4 weeks | 165 | 195 | 220 | 255 | 245 | 190 | 200 | 225 | 215 |
| 5 weeks | 115 | 140 | 135 | 140 | 135 | 145 | 115 | 160 | 145 |
| 6 weeks | 150 | 115 | 87 | 180 | 170 | 200 | 160 | 130 | 50 |
| 10 weeks | 14 | 12 | 10 | 12 | 11 | 13 | 10 | 11 | 9 |
| **Oxygen consumed* (initial 2,600)** | | | | | | | | | |
| 1 week | 800 | 1,750 | 1,200 | 1,950 | 1,650 | 1,300 | 1,350 | 1,550 | 1,550 |
| 2 weeks | 350 | 720 | 520 | 680 | 600 | 530 | 420 | 500 | 450 |
| 3 weeks | 270 | 310 | 310 | 310 | 350 | 320 | 260 | 340 | 380 |
| 4 weeks | 255 | 260 | 280 | 345 | 300 | 360 | 370 | 380 | 320 |
| 5 weeks | 235 | 250 | 265 | 260 | 265 | 255 | 250 | 235 | 220 |
| 6 weeks | 255 | 260 | 255 | 295 | 255 | 320 | 245 | 205 | 185 |
| **pH (initial 4.6)** | pH | pH | pH | pH | pH | pH | pH | pH | pH |
| 1 week | 4.4 | 4.1 | 4.7 | 4.5 | 4.6 | 4.8 | 4.8 | 4.6 | 4.6 |
| 2 weeks | 6.4 | 5.3 | 7.0 | 6.2 | 6.3 | 8.7 | 8.7 | 6.2 | 6.0 |
| 3 weeks | 6.7 | 6.8 | 7.3 | 7.0 | 7.5 | 8.1 | 7.9 | 8.9 | 8.2 |
| 4 weeks | 7.3 | 7.4 | 7.9 | 7.7 | 8.2 | 8.3 | 8.3 | 8.8 | 9.0 |
| 5 weeks | 7.9 | 8.2 | 8.4 | 8.5 | 8.6 | 8.6 | 8.7 | 8.8 | 9.0 |
| 6 weeks | 8.2 | 8.3 | 8.4 | 8.5 | 8.6 | 8.6 | 8.7 | 8.8 | 9.0 |
| **Objectionable odor** | | | | | | | | | |
| 1 week | putrid | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 2 weeks | putrid | ..... | slight | ..... | ..... | ..... | ..... | ..... | ..... |
| 3 weeks | putrid | slight | slight | slight | ..... | ..... | ..... | ..... | ..... |
| 4 weeks | putrid | slight | slight | slight | slight | slight | slight | ..... | ..... |
| 5 weeks | putrid | slight | mod. | slight | slight | slight | slight | ..... | ..... |
| 6 weeks | mod. | slight | slight | ..... | ..... | ..... | ..... | ..... | ..... |
| 10 weeks | slight | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |

* Alternate method used. Permanganate 10 times stronger than normally used.

**Table III—Nitrate Treatment of Corn Waste.**

| Storage period | Effect of addition of sodium nitrate to satisfy specified percentage of 5-day B. O. D. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 0% | 9% | 19% | 28% | 37% | 46% | 56% | 65% | 74% |
| | p.p.m. | p.p.m. | p.p.m. | p.p.m. | p.p.m. | p.p.m. | p.p.m. | p.p.m. | p.p.m |
| **5-day B. O. D. (initial 2,760)** | | | | | | | | | |
| 1 week | 2,750 | 2,250 | 2,480 | 2,200 | 2,590 | 2,530 | 2,490 | 2,670 | 2,670 |
| 2 weeks | 1,800 | 2,060 | 1,480 | 1,740 | 2,110 | 1,940 | 1,870 | 2,100 | 1,980 |
| 3 weeks | 1,580 | 1,590 | 470 | 1,080 | 1,400 | 990 | 1,200 | 1,400 | 1,310 |
| 4 weeks | 940 | 1,190 | 330 | 430 | 1,120 | 510 | 730 | 550 | 700 |
| 5 weeks | 590 | 880 | 135 | 215 | 725 | 220 | 220 | 295 | 270 |
| 6 weeks | 455 | 300 | 90 | 145 | 280 | 135 | 160 | 170 | 220 |
| 9 weeks | ..... | 105 | 50 | 120 | 120 | 85 | 115 | 95 | ..... |
| **Oxygen consumed (initial 5,050)** | | | | | | | | | |
| 1 week | 2,950 | 4,200 | 1,950 | 3,250 | 4,350 | 4,300 | 4,600 | 4,650 | 4,750 |
| 2 weeks | 1,050 | 3,700 | 1,000 | 2,000 | 4,150 | 3,400 | 550 | 4,050 | 3,900 |
| 3 weeks | 800 | 2,550 | 725 | 1,175 | 2,525 | 1,200 | 2,075 | 2,650 | 2,425 |
| 4 weeks | 670 | 1,425 | 470 | 600 | 1,450 | 550 | 775 | 1,025 | 875 |
| 5 weeks | 630 | 550 | 440 | 520 | 520 | 530 | 550 | 530 | 550 |
| 6 weeks | 490 | 390 | 335 | 425 | 435 | 425 | 430 | 410 | 455 |
| **pH (initial 6.5)** | pH | pH | pH | pH | pH | pH | pH | pH | pH |
| 1 week | 4.0 | 4.4 | 4.4 | 4.9 | 4.9 | 4.9 | 4.8 | 4.7 | 4.9 |
| 2 weeks | 3.8 | 3.9 | 6.2 | 4.6 | 5.1 | 5.3 | 4.9 | 4.8 | 5.2 |
| 3 weeks | 4.0 | 4.0 | 7.7 | 6.4 | 5.3 | 6.7 | 4.9 | 5.0 | 5.3 |
| 4 weeks | 4.5 | 4.3 | 7.9 | 7.7 | 6.3 | 7.8 | 7.8 | 8.1 | 7.8 |
| 5 weeks | 5.2 | 6.5 | 8.5 | 8.3 | 7.7 | 8.3 | 8.4 | 8.5 | 8.5 |
| 6 weeks | 6.2 | 7.1 | 8.7 | 8.6 | 8.4 | 8.7 | 8.8 | 8.8 | 8.9 |
| **Objectionable odor** | | | | | | | | | |
| 1 week | sour | ..... | slight | ..... | ..... | ..... | ..... | ..... | ..... |
| 2 weeks | putrid | ..... | mod. | slight | ..... | ..... | ..... | ..... | ..... |
| 3 weeks | putrid | ..... | mod. | slight | ..... | ..... | ..... | ..... | ..... |
| 4 weeks | putrid | slight | slight | slight | slight | ..... | ..... | ..... | ..... |
| 5 weeks | putrid | mod. | slight | slight | slight | ..... | ..... | ..... | ..... |
| 6 weeks | putrid | mod. | slight | slight | ..... | ..... | ..... | ..... | ..... |
| 9 weeks | mod. | slight | ..... | ..... | ..... | ..... | ..... | ..... | ..... |

* Alternate method used. Permanganate 10 times stronger than normally used.

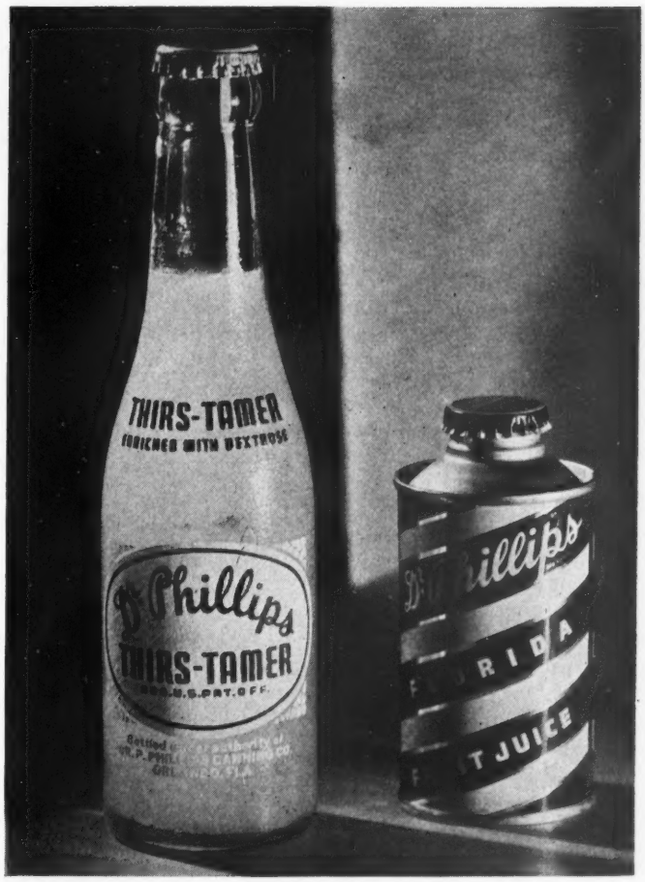
# New Packages & Products

## *Carbonated Citrus Drink*

SALES of the bottled beverage industry have skyrocketed in recent years. Probably that is the green-pasture promise which has spurred Florida citrus fruit juice canners to pack citrus juice in 6-oz., five-cent cans to sell through roadside stands and other bottled-beverage outlets. Many Florida canners now include the 6-oz. container in their pack.

Dr. P. Phillips Canning Co., Orlando, Fla., packs citrus juices in a 6-oz. can closed with a bottle cap. The juice can be drunk from the can the same as from a bottle. Unfortunately, the freight rate limits the distribution of the 6-oz. container to the area immediately adjacent to Florida.

Though the sale of canned juice is limited by the freight rate, the bottled-beverage field offers too many inducements to pass up. The Dr. Phillips company is introducing this year a carbonated beverage with a citrus-fruit base. The ingredients are shipped to franchised bottled-beverage distributors as concentrates. The freight rate is relatively low. Bottles with burnt-on permanent labels and lithographed caps are also supplied to bottlers.




## *New Design for Meat Line*

A NEW WRAPPER for slab bacon has been introduced by Miller & Hart of Chicago—the first step in the repackaging of the company's entire line of meat products. Pictured here is the streamlined red, buff and brown design created by Ernest A. Spuehler to replace the old, plain wrapper shown on the right.

The new wrapper follows the trend to brighter, more eye-compelling packaging. The design of other Miller & Hart packages will be coordinated with that of the bacon wrapper.

## *Ready-to-cook Spinach*

FRESH SPINACH, washed and ready to cook, is being packaged in transparent cellulose bags by the Sunny Sally Vegetable Growers of Los Angeles. The transparent bags keep the moisture in and the dirt out, and, it is claimed, permit the product to "breathe" for the short time it is in the package.

This Sunny Sally spinach appeals to homemakers in two ways. It looks attractive in the transparent bag, and it eliminates the tedious task of desanding necessary with ordinary fresh spinach. The latter asset is extolled on the reverse side of the label stapled to the end of the bag to hold it closed.

# 12 Causes of Springers in Cans

## Part II—Denting of cans, changes in altitude and temperature of storage, chemical reaction between ingredients in product and between product and can

By G. V. HALLMAN,* *Research Department, Continental Can Co., Chicago, Ill.*

ANOTHER common cause of denting and jamming is rough handling during shipment. Some causes for excessive denting during shipment which the canner can control are:

1. The use of cases of the wrong size or strength.
2. Packing too many cans in the case.
3. Loading cases loosely in car or truck, thus failing to prevent shifting during shipment.
4. Improper sealing of cases so that cans shift in the case.

Low-vacuum cans, the ends of which are normal at lower altitudes, may become springers when shipped to higher altitudes. At a lower altitude there is greater atmospheric pressure applied to the ends of the can to hold them in a flat or normal position. But at a higher altitude, the atmospheric pressure is lower and thus there is less pressure against the ends of the can. At higher altitudes the lower external pressure may not be sufficient to maintain the normal position of the ends of cans having low vacuum, and springers result.

Similarly, increasing the temperature of storage of a can, the ends of which are normal at usual storage temperatures, may cause a low-vacuum can to become a springer. Increasing the temperature of the product in the can increases the vapor pressure within the can. Thus, in some hot climates the increase in vapor pressure may be sufficient to cause some low-vacuum cans to become springers.

### *Type of Ends*

The stiffness of tinplate used for the can ends and the profile of the can ends may affect the internal pressure required to force out the ends. Can ends cut from stiff tinplate of high temper resist springer formation more than ends from softer tinplate. With other factors equal, can ends made from heavier tinplate require more internal pressure to force them into a convex position than can ends cut from tinplate of lighter weight. Properly placed beads and panels in the profile of the can ends assist them in maintaining the normal flat or concave position.

### *Chemical Action*

Occasionally, springers may occur due to a chemical reaction between ingredients producing gas and internal pressure within the can. In canned vinegar-pickled pigs' feet, a chemical reaction occurs between the bones in the pigs' feet and the acid in the vinegar, resulting in gas formation which causes springers. This reaction produces gas slowly and may be retarded by storage of the cans under refrigeration.

Another chemical reaction of this type may occur during the processing of canned dog food containing excessive quantities of nitrate and certain types of bone meal. The gas produced by this reaction consists mostly of nitrogen and carbon dioxide. When normal quantities of nitrate and adequately precooked bone are used in the dog food formula, springers do not occur.

### *Hydrogen Springers*

Springers commonly known as hydrogen springers do not occur generally in canned meats and are limited to a few items. These are: Mince meat, vinegar-pickled meats and products with Mexican-style sauces, such as chili and tamales. Hydrogen springers in mince meat and vinegar-pickled meats are caused by the formation of hydrogen gas resulting from a chemical reaction between the acid in these products and the tin and iron of the tinplate of the can.

The cause of hydrogen springers in chili and in tamales has been difficult to explain. The acidity of these products is so low that the production of hydrogen by the acid and tinplate reaction alone is not likely. Evidence that the acidity is not responsible is furnished by pork and beans, a product similar to chili in acidity and composition. Hydrogen springers occur much more frequently in canned chili than in canned pork and beans. Both products contain meat, beans, fat, tomato puree and spices. The main difference in the composition of these products is the kind of spices. However, the same spices are used in both canned chili and tamales. Canned Mexican-style beans which rapidly develop into hydrogen springers also contain spices similar to those used in chili and in tamales. It appears from the above that products containing certain spices tend to form hydrogen springers more rapidly than similar products in which these spices are not present.

In order to determine if such spices had an effect on the rate of formation of hydrogen springers, test packs were made with various combinations of the ingredients and spices commonly used in chili. In these test packs, the following ingredients were added:

1. Meat, soaked beans and tomato sauce.
2. Meat, soaked beans, tomato sauce and cumin.
3. Meat, soaked beans, tomato sauce and oregano.
4. Meat, soaked beans, tomato sauce and chili powder.
5. Meat, soaked beans, water, cumin, oregano and chili powder.
6. Meat, soaked beans, tomato sauce, cumin, oregano and chili powder.

These test packs consisted of 50 No. 1 cans in lots 1 to 4 inclusive, and 40 No. 1 cans in lots 5 and 6, all cans being made from the same lot of plate. The canning

(*Turn to page* 101)

**Table I—Springers in Test Packs of Chili.**

| Time in days | Percentage of springers | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 37 | 76 | 136 | 234 | 300 | 381 | 504 | 602 | 678 |
| Lot No. 1 | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 18 | 24 |
| Lot No. 2 | 0 | 0 | 0 | 0 | 2 | 26 | 46 | 66 | 78 |
| Lot No. 3 | 0 | 0 | 0 | 2 | 46 | 80 | 92 | 94 | 94 |
| Lot No. 4 | 0 | 0 | 0 | 10 | 56 | 86 | 96 | 98 | 100 |
| Lot No. 5 | 0 | 0 | 0 | 15 | 75 | 92.5 | 92.5 | 95 | 95 |
| Lot No. 6 | 0 | 0 | 5 | 35 | 87.5 | 92.5 | 97.5 | 97.5 | 100 |

* From a paper presented before the meat section of the National Canners Association Convention, Chicago, January 23.

# Hints and Hurdles

## One Product Sells Another

FLORIDA FRUIT CANNERS, INC., Frostproof, Fla., packs its citrus juices in both 6-oz. cans and 6-oz. bottles. Coca-Cola distributors in Georgia and Florida are distributing agents for the bottled juice to filling stations and roadside stands where Coca-Cola is sold.

Only a small portion of Florida citrus juices is packed in 6-oz. containers, but the number of 6-oz. cans and bottles packed runs into millions. Most of the 6-oz. packages bear the manufacturer's label. This container also carries the canner's top quality. Sold through bottled-beverage outlets, the nickel seller advertises to a new market to help boost sales of the canner's own brand of juices sold through food stores.

## Tourists Send It Home

SOME YEARS AGO, C. S. Taylor & Co., Davenport, Fla., manufacturer of confections and marmalades made from Florida citrus fruits, had representatives in many parts of the country selling a variety of fancy packaged products. Today, the plant's capacity, the output of 40 workers, is absorbed by the Florida market. But the distribution of Taylor products is still nationwide. Visitors to Florida ship home, or carry back with them when they return, the fancy packaged products of the Taylor company. These products are offered for sale in most all of the outlets where Florida citrus fruit is sold for shipment to the folks back home.

## Tested Tips on Psychology Of Running a Food Business

Some Florida citrus canning plants are open to the public. Fifty to 100 people, visitors from all parts of the country, tour these plants every day during the canning season. The impression they carry away with them influences the buying of many friends and relatives back home.

Some of the plants open to visitors, especially those packing segments, put uniforms on their employees. The effect is quite impressive on visitors. A superintendent of one of these plants, commenting on the value of uniforms, said: "Uniforms have a good effect on visitors, and they're plenty of them coming and going every day. It's psychology. They like to think of eating foods made in a plant that's clean.

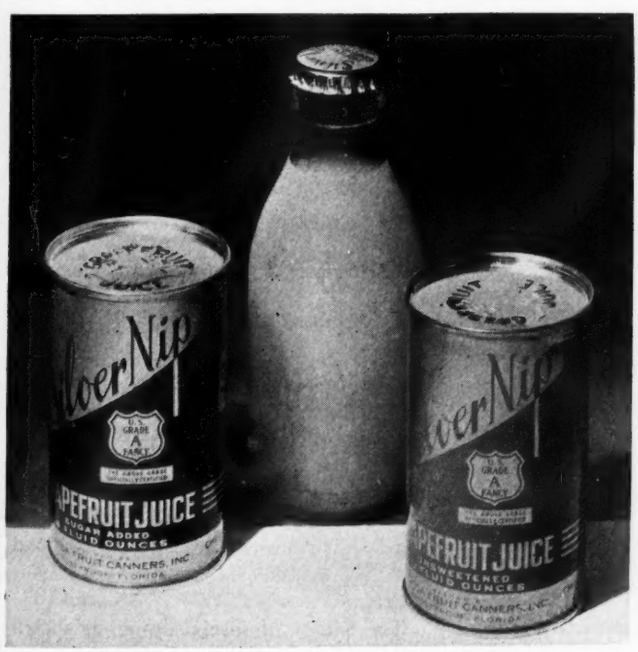
"Uniforms help the girls, too. When the girls who fill segments into the cans are all in fresh, clean uniforms—and uniforms sure make a girl look pretty smart—the girls try to keep clean. And that makes them neat and clean in their work. It's just another psychology. It's surprising how much neater and cleaner a plant is once you put uniforms on the girls. Running a canning plant is just one psychology after another. It's curious how many psychologies it takes to run a canning plant right."

## Straws in the South Wind

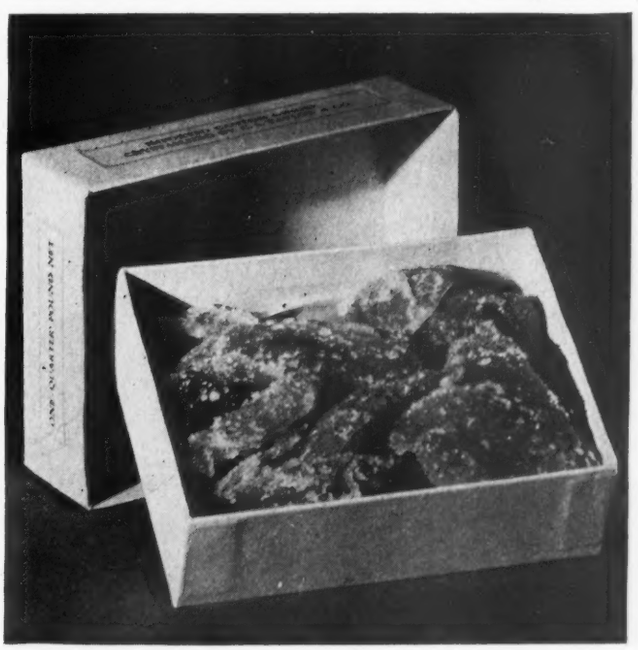
FLORIDA RANCHERS, those ranging cattle and those pasturing and feeding, are experimenting with varieties of grasses suitable to the climate and soil. They are experimenting with range grass, pasture grass and grass for silo filling. Final results are still in the future.

Another experiment indicates results less far off. Milk passed through a flash pasteurizer at a temperature near 300 deg. has been used to produce homogenized true flavored whole milk and ice cream mix, stable in a can throughout a long shelf life.

It is not impossible that the net result of these experiments, possibly not far in the future, will be dairy and meat industries which will make the South less dependent on the rest of the country.




**Florida Fruit Canners, Inc., Frostproof, Fla., sells citrus juice in 6-oz. containers for a nickel through bottled-beverage outlets. This promotes sales of the brand sold through food stores.**



**Imported Canton ginger, crystallized by C. S. Taylor & Co., Davenport, Fla., gets wide distribution through sales in Florida to visitors who ship it to the folks back home.**

# Coordinates Trucks with the Job

**Bottler considers all the "angles" in selecting type of truck and body for complete delivery fleet. The problems involved and their solutions are discussed in this article. Many principles of truck operation are covered**

IN June, 1940, when the Young's Market Co. acquired the franchise for the sale and distribution of the Dr. Pepper beverage in the Los Angeles territory, it had to start from scratch and not only build a new bottling plant but purchase an entire fleet of new trucks. And therein lies a story as to what that company considers the most desirable and economical type of truck and body for the work.

Young's Market had long been in business in the sale of fine groceries, meats, coffees, teas and bottled goods in Los Angeles and southern California and hence was thoroughly familiar with truck distribution problems within the Dr. Pepper franchise area. But the economical solution of the bottling problem required trucks and bodies especially designed for the work.

The requirements which the company considered the new trucks must meet included first of all a smart appearance in order to make the most of their advertising value. The next requirement was a truck of sufficient case-carrying capacity to cover a one-man route within the limits of the average working day, together with a truck body from which the loaded cases could be removed and the empty cases put back with a minimum of time and effort by the driver salesman.

**Close-up of one of the 16 new 99-in. wheelbase cab-over-engine Internationals used by Young's Market Co. in the distribution of Dr. Pepper's beverage in the Los Angeles area. Besides the good maneuverability of the cab-over-engine model, the truck's body is featured by a low floor height. This is obtained through the use of wheelhousings, which makes it easy for the driver to unload**

In addition to the above requirements, the type of truck selected must have good maneuverability, be of moderate first cost, give good gasoline oil and tire mileage under the loads carried and have adequate service facilities within the area covered.

Having had 26 Internationals in service since 1935, the company had adequate operating records on that particular make. So to standardize the fleet, it purchased 16 Internationals and put them into operation by a subsidiary company known as the Dr. Pepper Bottling Co.

The cab-over-engine type of chassis was selected because of its shorter overall length with a given body length, its better weight distribution as between front and rear axles and its greater maneuverability.

The bodies, of special design as shown in the illustrations on this and the opposite page, were built by the Advance Body Works in Los Angeles. They carry 240

**An open-face front, together with a design which makes use of white cement plaster, plate glass, Cararra glass, bronze and glistening white tile distinguish the new 22,000-sq.ft. Dr. Pepper plant in Los Angeles**

This line-up of the Dr. Pepper Los Angeles fleet shows the distinctive appearance of the cab-over-engine International and its unusual body. Note the light-weight skeleton-type construction of the body's longitudinal centerline dividing partition and the transverse streamlining of the front and rear ends of these delivery trucks.

cases each and, by the use of rear wheelhousings, have their floors only 33 in. off the ground. With the cases stacked as shown, they are extremely easy to load and unload.

To enhance the advertising value of the trucks, the cabs and bodies are painted a tomato red with the wheels a canary yellow. The lettering is in white.

The illustration at the bottom of this page shows the general construction of the special body with its notched front end, the straight rear end and the skeleton type longitudinal centerline partition. Body does not have a permanent roof.

Protection against rain is provided by a removable heavy canvas tarpaulin. Except for the bottles packed in corrugated paper cartons in place of wooden cases, protection against rain washing off the labels is unnecessary since the Dr. Pepper bottles have the trade name blown into the bottles themselves and carry no paper labels.

In operation, a space is always left open at the rear end of the body for loading the first of the empty cases picked up without disturbing the rest of the load. As additional empty cases are picked up, they are loaded in the space formerly occupied by the delivered full cases.

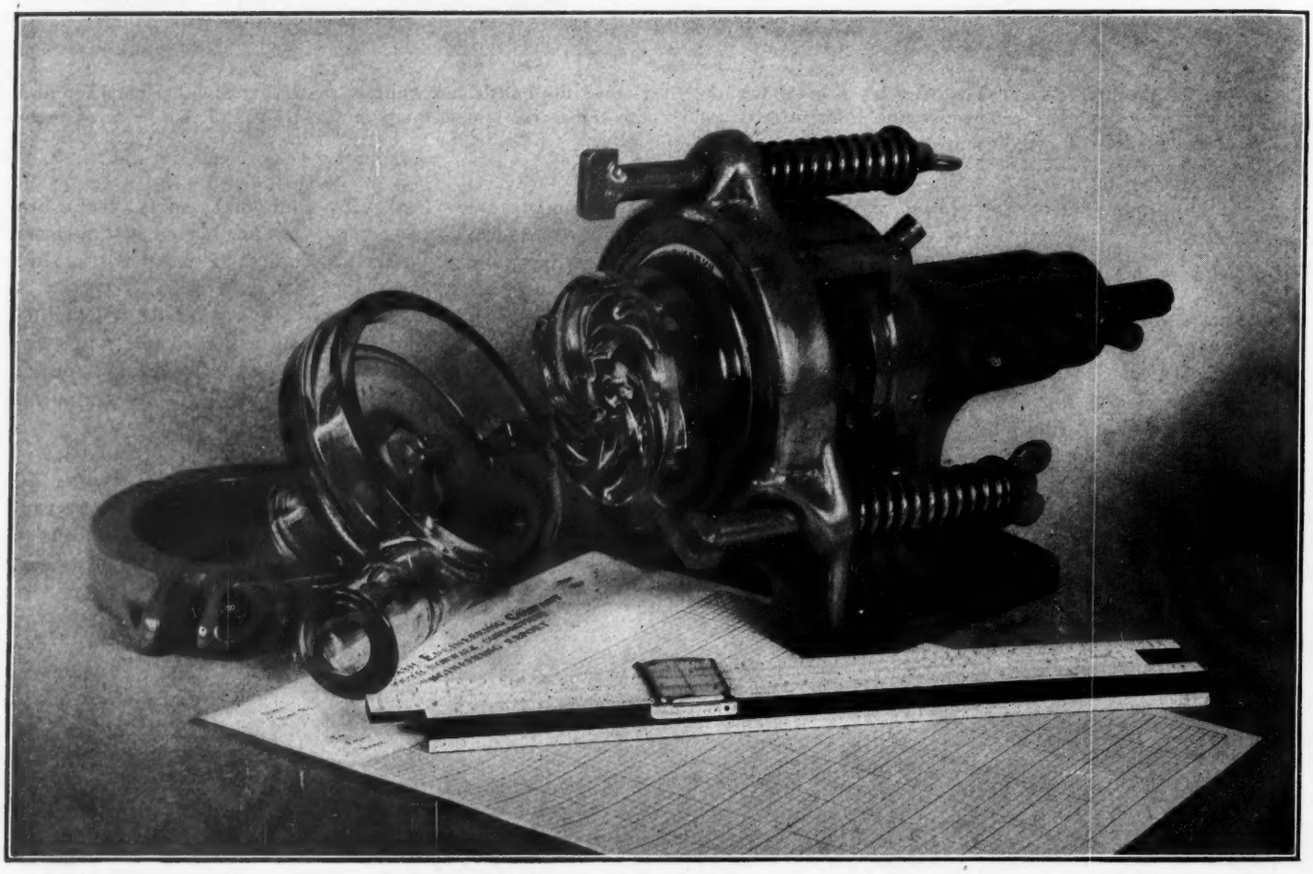
At the present writing, 24 distribution routes are in operation. These routes are not yet running to full capacity since it usually takes from 1½ to 2 years to put a new drink on the market and get a fair distribution.

Now the trucks are distributing 50 cases per truck per day. Two years hence, it is expected they will average from 150 to 200 cases per truck per day.

A two-wheeled hand truck is here being used to speed up the driver's work when more than one case of Dr. Pepper's beverage has to be delivered on the same order. Full advertising value of the body is obtained by the Dr. Pepper lettering on the cab door, on the rear wheelhousing cover plate and on the upper section of the longitudinal centerline partition where it shows above the top of the load of cases. Other features of the body include the notched front end, the rounded top corners of the front and rear ends and the wide chromium-plated side rub rails to match the front bumper

# NASH *Pump of Glass*

## now *available in smaller size*



One of the most sensational developments of the past year was the Nash Pump of Glass, a 1½" x 2" centrifugal pump of "PYREX" brand heat and shock resisting glass, product of cooperation between Nash Engineering Co. and the Corning Glass Works.

The outstanding success of this 6000 gallon an hour pump in service immediately created a demand for a smaller size, and we now offer a ¾" x 1" pump with a capacity of 10 gallons per minute, ideally adapted to smaller installations, and for laboratory and pilot plant service.

Working parts of this pump, including impeller and casing, are constructed entirely of glass. It is fully transparent, and has the same advantages as the larger pump where corrosive liquids, or liquids which must be kept chemically uncontaminated, are to be handled . . . A unique mechanical seal replaces the conventional stuffing box, and a safety unloading device eliminates possibility of fracture of the glass casing. This pump will handle hot acids or brine cooled liquids with equal facility, and it offers a solution to many chemical, process, and food plant problems. Write for bulletin describing this remarkable pump in detail.

**NASH ENGINEERING COMPANY**

**402 S. WILSON ROAD, SOUTH NORWALK, CONN.**

The Food Industry News

GENERAL NEWS, BUSINESS TRENDS, MEN, JOBS AND COMPANIES • APRIL, 1941

# Ways To Make Products Better Outlined by Bakery Engineers

## Methods of improving processing methods and ingredient control explained. Assistance given on enrichment problems

QUALITY improvement and control of bakery products was emphasized throughout the program of the 18th annual meeting of American Society of Bakery Engineers, in Chicago, March 10 to 13. An all-time high record of 1,302 registrants was set.

In the session sponsored by American Association of Cereal Chemists, relationship between dough absorption of water and baking loss was discussed. In the experimental doughs there appeared to be a questionable relationship, as time and temperature of baking seemed to determine the moisture content of the finished bread. In those doughs the ratio of crust to crumb was very high, which means that the rate of evaporation during baking is high. In commercial doughs, the ratio of crust to crumb is relatively low and evaporation loss correspondingly less. Under carefully controlled baking conditions, high dough absorption of water gives increased yield of baked bread and within the limits of good practice gives improved texture and tenderness of bread.

Ingredients such as flour, salt, water, milk, sugars or sweetening agents, and shortening agents were dealt with in respect to baked bread quality. Selection of these ingredients on a grade or quality basis was cited as paying dividends in a reduction of bakeshop problems and difficulties and in a raising of the quality level of the finished products.

For the first time, doughnuts and factors having to do with their production and with the causes and cures for staling were given a place on the program. Care of equipment, cleaning of cooking fat, controlled time and temperature of cooking, avoidance of dusting flour, use of tinned metal trays or refrigerated conveyors for cooling and adoption of moisture- and grease-proof packaging materials were listed among the practices to be followed.

Production control over cake shop operations was reported to give a 30 percent decrease in cost of production with no change in production methods used. Similar control over wrapping operations gives a 35 percent reduction in direct labor cost. Sugar spots on cakes were identified as the result of drying out of the cake batter before it was baked. Too long a period between the scaling of the batter and introduction into oven at correct baking temperature will give sugar spots under ordinary room temperature and humidity conditions. Proper adjustment of humidity in the make-up area will prevent sugar spots if there has to be a waiting period between scaling and baking.

Similar temperature and humidity control in the production area make for improved pie baking. Low-melting-point fats and an oven temperature of 450 deg. F. for 30 to 35 min. for an 8-in. pie were cited as best for making pies.

Taste and flavor of Devils food cake were best when pH was held at 7.7 to 8.0. A pH of less than 7.0 gave preferred taste and flavor in other cakes. The type of cake determined the pH level recommended.

A high point in the four-day program was the round table discussion on vitamin and mineral enriched bread and the production problems to be taken into consideration. Enriched bread backed by improvements in ingredient selection and processing operations was viewed as conducive to increased bread consumption as well as improved competitive relationships. A decrease in pan size was recommended as a step in flavor improvement. Flavor improvement was stressed as an essential to making "enriched" bread a commercial success particularly if the bakers are going to be forced to absorb the added cost.

Master mixes to be added to the dough batch, enriched yeast and the concentrates themselves were listed as means of enriching the dough batch as well as the use of enriched flour itself.

Use of wheat germ and special flours was reported to entail storage difficulties, particularly rancidity development, whereas there were no storage problems when special yeasts, concentrates and master mixes were used. Wheat germ bread was reported as staling most quickly of all enriched breads tested.

Cost of enrichment was given as 32 cents per barrel of flour when enrichment was obtained by addition of chemicals in comparison with 21 cents per barrel of flour used when special yeasts were used. In the finished bread 1/6 cent increase in cost of materials used was given without identification of the type of enrichment materials used.

**BAKERY ENGINEERS ELECT THEM FOR 1941**

American Society of Bakery Engineers chose these men to run the Association for the coming year. Left to right, they are: second vice-president, G. Richard Ludlow, Quality Bakers of America, New York; president, Cecil C. Cadwell, Awrey Bakeries, Detroit; secretary-treasurer (reelected), Victor E. Marx, "Bakers Helper," Chicago; first vice-president, Wm. F. Gossadge, Grocers Baking Co., Louisville.

# Large Amounts of U.S. Foods Will Be Shipped to Britain

**Lend-lease appropriation supplies funds. British food mission arrives here to discuss its country's food requirements**

THERE is no longer any official doubt but that Britain is to get large quantities of food from the U. S. as part of the lend-lease program. A British food mission arrived in this country late in March to discuss the Island's supply needs and to work out ways of filling them from America's larder.

The lend-lease appropriation includes a lump sum item of $1,350,000,000 for "agricultural, industrial, and other commodities and articles." How much of this will go for food is, at this writing, impossible to state but the general feeling is that foodstuffs will take a sizeable chunk of this sum when the aid shipment program really gets moving.

From $300,000,000 to $500,000,000 is likely to be spent in the next two years for food for the British.

The biggest British demand is expected to be for pork products, dairy products (particularly canned milk, cheese and butter), canned fruits and vegetables and eggs, particularly dried eggs. Large-scale stimulation of dried eggs production already is being urged by the defense commission's food supply section. This is expected to carry over also into the dehydration of fruits and vegetables as a substitute for canned goods to save shipping space. Britain's use of American foodstuffs probably will depend largely upon the amount of shipping available for this purpose.

In addition to British food larger-scale American aid to other nations has begun to take shape. A $5,000,000 food loan to Finland was announced by the Export-Import bank. This will be used largely for foods in the fats and oils class to replenish a dwindling Finnish supply.

Further relaxation of the British blockade to permit foodstuffs to go into unoccupied France indicated that a rather general and continuing policy of sending limited quantities to this area is in the making. The change in the British attitude is credited to the American government, acting in response to growing public opinion, and to the decision of the British government that such a policy would help keep France from falling into Hitler's lap.

## Meat Regulations Revised

DETAILED meat-products regulations were issued in revised form on February 26 by the Bureau of Animal Industry, covering principally meat-products labeling. These new rules, effective October 1, give certain definitions and prescribe label requirements very much in harmony with the Food, Drug and Cosmetic Act. Adoption of these new rules by BAI is a further step toward closer cooperation between that agency and the Food and Drug Administration.

# Bakers and Millers Get Set for "V-day"

**Date for launching the enriched flour and bread likely to be between April 25 and May 10**

UNDER the guidance of Paul Cornell, advisor and coordinator of the "enriched" flour and bread program, flour millers and bakers are working to set a "V-day," on which a nationwide educational and advertising program can be initiated to tie in with Federal national health and defense programs.

A tentative date between April 25 and May 10 has been unofficially given. The date will be selected to coincide with the date of the national health conference purportedly to be called by President Roosevelt. Food, Drug and Cosmetic Act standards covering "enriched" flour and bread are expected by "V-day."

As a preliminary step in organizing the "V-day" program, a milling and baking industry conference was held March 5 at Chicago. This meeting was held in an effort to get coordination of governmental, industrial, professional, scientific and educational factual information and activities behind the cooperative effort. A comprehensive program was presented to an audience of approximately 600.

James F. Bell, General Mills, Inc., Jack Koenig, Jr., American Retail Bakers Association, and L. J. Schumaker, president of American Bakers Association put their respective industries on record to produce the flour and bread identified as being so essential to good national health.

Wm. A. Quinlan, general counsel of ABA, emphasized the need for a labeling distinction between "enriched" bread and bread made from vitamin $B_1$ and special germ flours.

## Tennessee Enacts Food Law

TENNESSEE'S new Food, Drug and Cosmetic Act is another step in correlating state and Federal legislation. The act, which revamps Tennessee's original Food and Drugs Law (1907, 1911 and 1913) specifically provides definitions, stand-

*Harris & Ewing*

**ARMY CENTRALIZES PERISHABLE PURCHASES**

**The War Department is centralizing the buying of fresh produce through several purchasing offices in marketing centers throughout the country in close proximity to Army posts. These offices are coordinated through a central office in Chicago. John A. Martin, formerly vice-president and general manager of Wesco Foods Co., Chicago, is chief of the perishable foods section of the Division of Purchases of OPM. Above are Major Michael Zwicker, connected with fresh fruits and vegetables purchases, and Major Ribert F. Carter, of the nonperishable food supply, looking over food maps of the U. S. Note a wall chart in background.**

ards and correct labeling requirements for foods, prevents sale of adulterated or misbranded foods, defines tolerances and states penalties for violations.

Prohibited under the new Act are manufacture, sale, delivery or receipt of adulterated or misbranded foods, false advertising or labeling of foods, and refusal to permit inspection, under proper authority, of food plants. Sections of the Act define emergency permit control, food in transit for completion purposes and tolerances for added poisonous ingredients in foods.

## $7,000,000 from Stamps

LATEST REPORTS on the food stamp plan, released March 3 by the Department of Agriculture, placed January surplus food buying at more than $7,000,000 worth of farm products. Using blue surplus food stamps, the 3,000,000 families eligible to receive public assistance increased their purchases of agricultural products by 50 percent for butter, eggs, pork products, flour and cereals, fruits and vegetables.

## More Beer Cans Than Bottles

PACKAGING of beer and ale in retail containers has shifted rapidly from glass to tin cans. In 1937, almost exactly equal numbers of bottles and tin cans were used. In 1939, 11 percent fewer small containers were reported, and only 30 percent of these were glass — 370 million bottles and 776 million cans.

# Army Estimates Requirements For Canned Fruit, Vegetables

### Needs for 1941 put at 3,271,000 cases of fruit and 7,528,000 cases of vegetables. Tomatoes, beans, corn, peas, top list

ESTIMATED requirements of the 1941 canned fruit and vegetable pack for the nation's armed forces have been submitted to the canning industry as a guide for canners in scheduling their contract acreage and season's pack this spring and summer. At present, at least, the food section of the defense commission is not making recommendations regarding the desired size of the 1941 pack, although it is hoped that supplemental estimates of canned goods requirements for foreign shipment, particularly to Britain, is expected to be available shortly.

The estimates of military requirements are 3,271,000 cases (computed as six No. 10's per case) of fruits and 7,528,000 cases of vegetables. This is 9 per cent of the average (1935-39) fruit pack and 8 per cent of the five-year average vegetable pack. Total quantity figures are considered reasonably reliable although case totals may vary due to purchases of other sizes, and the breakdown by commodities may vary due to available supply, relative price, availability of stocks, requirements for balanced rations and variety in diet.

Total calculated requirements include not only the Army and Navy, but also the Marines, Coast Guard and Civilian Conservation Corps. Army totals cover an estimated 1,400,000 men, while the CCC requirements is the equivalent of 400,000 enlisted Army men. Coast Guard and Marines are calculated as one-third the Navy total.

Army feeding experience and actual Navy purchases last year were used to compute the estimates.

Breakdown by individual commodities follows:

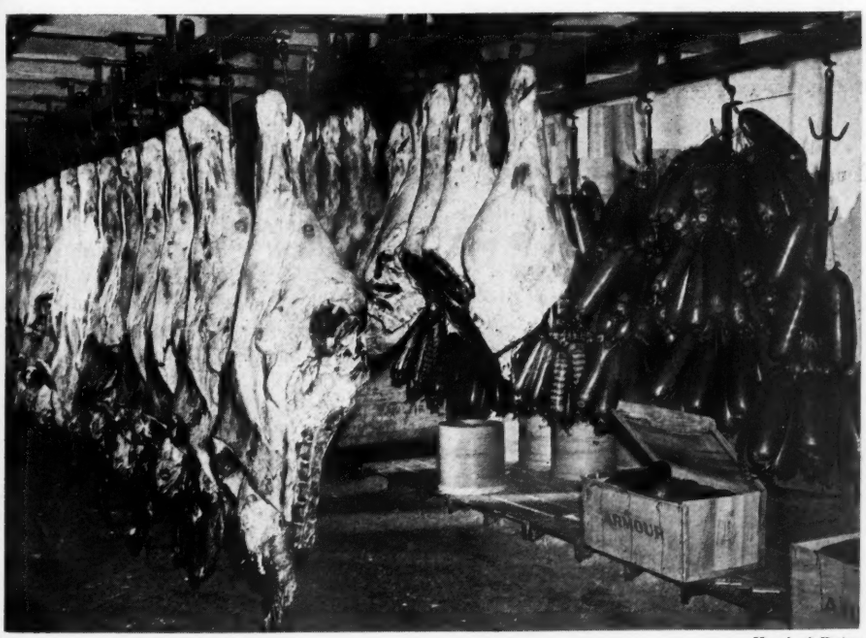
### Requirements for Armed Forces

**Fruits**

| *Product* | *Can size* | *Total cases* | *Total cases basis 6/10's* |
|---|---|---|---|
| Apples | 10 | 513,875 | 513,875 |
| Apple sauce | 10 | 382,431 | 382,431 |
| Apricots | 10 | 341,505 | 341,505 |
| Cherries | 10 | 287,840 | 287,840 |
| Grapefruit | 5 | 287,840 | 310,867 |
| Peaches | 10 | 396,185 | 396,185 |
| Pears | 10 | 348,016 | 348,016 |
| Pineapple | 2½ | 324,869 | 353,118 |
| Prunes | 10 | 304,001 | 304,001 |
| Other fruits | 10 | 33,661 | 33,661 |
| **Total** | | **3,220,223** | **3,271,499** |

**Vegetables**

| *Product* | *Can size* | *Total cases* | *Total cases basis 6/10's* |
|---|---|---|---|
| Beans, green and wax | 10 | 907,000 | 907,000 |
| Beans, lima | 10 | 288,000 | 288,000 |
| Beets | 10 | 370,880 | 370,880 |
| Carrots | 10 | 274,200 | 274,200 |
| Corn | 2 | 1,126,311 | 846,850 |
| Kraut | 2½ | 474,424 | 515,678 |
| Peas | 10 | 763,700 | 763,700 |
| Pumpkin | 10 | 49,983 | 49,983 |
| Pumpkin | 2½ | 360,000 | 391,300 |
| Spinach | 10 | 611,556 | 611,556 |
| Sweet potatoes | 2½ | 180,000 | 195,652 |
| Tomatoes | 10 | 1,557,560 | 1,557,560 |
| Tomato juice | 10 | 338,200 | 338,200 |
| Other vegetables | 10 | 417,620 | 417,620 |
| **Total** | | **7,719,434** | **7,528,179** |




*Harris & Ewing*

**ARMY RECOGNIZES VALUE OF MEAT**

**As part of its plan to provide an all-round energy ration, the OPM has materially broadened the buying of domestic meat supplies. In addition to other meat items, the program is said to require all of the domestic canned meat facilities, with some South American canned beef being purchased if necessary. The Army is also substantially increasing its use of boneless meat products as a space saving device through packaging in frozen form. Above is shown the stock of beef quarters and sausage products in the cold storage room of an Army camp.**

## Fat-Trading Rules Issued

NEW special provisions applicable to trading in fats and oils were promulgated on March 8 by the Secretary of Agriculture. These rules define marketing practices under the Commodity Exchange Act for various fats and oils, including many of those which have food significance. Comparable regulations for the byproducts of seed oil making are also included, especially for soybean and cottonseed meal.

# Food Administration Now in the Making

**Will coordinate requirements of Army, civilians, the British and other foreign countries**

ESTABLISHMENT of a Food Supply Administration is definitely in the making, and "tight spots" in making supplies of some commodities go around is being officially rated in defense quarters as probable.

The primary job of the Food Supply Administration will be one of coordination of requirements for the military, for Britain and for whatever foreign relief programs develop with civilian needs. In addition, need is felt for an agency with authority to get action on increasing supplies in food lines likely to develop shortages and to correlate estimates of probable needs with production schedules—for instance, to determine next winter's canned fruits and vegetables requirements before the seasonal pack is finished.

How the Food Supply Administration is to be set up was still an open question late in March. Most likely method is establishment of a section within the super-super agency being built up to handle lend-lease matters. Although this agency's first job will be expediting aid to Britain it also will cover the overall problem of defense allocation and coordination. There is support for a food administration entirely separate from other defense agencies on the grounds that it would thus have an unbiased attitude. Most opposition is leveled against giving the job to the Department of Agriculture which defense staff advisers feel is, naturally and properly, too producer minded for the job.

# F&DA Food Standards Mark Time in March

ONLY one standards hearing has been held since the last report in these pages (FOOD INDUSTRIES, March, page 77). That hearing was on habit-forming drugs and therefore of no interest to food manufacturers.

Announcement was made of the reopening of the cream cheese hearing, for which a final order has been awaited for several months. The Neufchatel and cottage cheeses hearing was also postponed, to April 21, to coincide with the reopening of the cream cheese hearing.

The hearing on canned fruits of irregular sizes and shapes, originally scheduled for mid-January, has been again postponed. In the February 28 *Federal Register* the Federal Security Administrator slightly broadened the scope of the hearing by proposing a limit for and method of determining gritty particles in canned pears. Then late in March the Administrator ordered the hearing postponed from April 1 (FOOD INDUSTRIES, March, page 77) until fall. No new date has been set.

The hearing on chocolate products, scheduled to resume on March 31, has been postponed to May 12 at the request of the American Sugar Cane League.

**ARMY FOOD ADVISER**

**Howard B. Cunningham, director of purchases for National Biscuit Co. for several years, has succeeded Douglas MacKeachie in charge of subsistence and supplies purchasing for the office of Production Management. Mr. MacKeachie has been promoted to deputy director of the Division of Purchases of the OPM. Before going with National Biscuit, Mr. Cunningham for 15 years was in the milling business in Minneapolis and Kansas City.**

## Tea Standards Fixed

TEA STANDARDS for 1941, selected under terms of the Federal Tea Act enforced by F&DA, cover the following types of tea: Formosa Oolong, Formosa Black, Congou, Java, Japan Black, Japan Green, Japan Dust, Gunpowder, Scented Canton and Canton Oolong. The standard samples, put up in half-pound tins, will be available to all importers of tea and shippers of tea to this country, so that these firms may compare their product with the standards.

## Martin Heads Meat Canners

NATIONAL MEAT CANNERS ASSOCIATION has elected these officers for 1941: President, C. E. Martin, Illinois Meat Co., Chicago; vice-president, Gus Roberts, Cudahy Packing Co., Chicago; secretary, J. Emmett Clair, Republic Food Products Co., Chicago; treasurer, Henry Manaster, United Packers, Inc., Chicago.

# U.S. Tin Smelter To Be Constructed

**Will have output of 18,000 tons a year, or one-fourth of the country's requirements**

NEGOTIATIONS for the first "permanent" U.S. tin smelter have come to a head with the decision of the Federal Loan Agency to give the Dutch firm of N. V. Billiton Maatschapij the job of constructing the plant. Billiton also will operate the smelter at least at the beginning; an American firm—either Phelps-Dodge or American Metals—may be substituted as operator later.

The smelter will have 18,000 tons annual capacity, a size which corresponds to the annual volume of Bolivian concentrate for which Reserve Metals Co., an FLA subsidiary, has contracted for five years.

Costing between $2,500,000 and $4,000,000, the smelter will be owned outright by the government and will be built and operated for a fixed fee to the Dutch firm. The 18,000-ton capacity represents roughly one-fourth of America's annual tin consumption, but it must be remembered that Reserve Metals' Bolivian ore contract provides that up to 6,000 tons of the tin—more under certain circumstances—can be diverted to British order at their request.

Location of the smelter was not definitely established when the agreement with Billiton was announced.

## Reports on Container Costs

CONTAINERS, labels and packaging materials consume about 22.6 percent of the factory value of canned and preserved food products, according to a Department of Commerce release. The canning and preserving industry last year spent $171,349,936 of a total product value of $755,950,036 on packaging supplies to insure sanitation, attractiveness and convenience of handling.

## Tennessee Lifts Oleo Tax

"TAX-FREE" oleomargarine is now being marketed in Tennessee stores in a breakdown of state barriers against the product. The new law, signed by Gov. Cooper on February 15, removed the 10 cent tax on oleomargarine made from domestic oils, containing 8,500 units of vitamin A, but oleo made from foreign oils is still taxed.

While the tax is removed entirely for restaurants and boarding houses, the state tax for manufacturers is raised from $5 a year to $300, and the tax for retailers becomes $5 a year instead of $2.

The law restricts the use of a yellow color on packages, and any printed comparison of the product with butter.

### Introduces Six-vitamin Milk

A "SIX-VITAMIN" MILK, at 15 cents a pint, has been introduced by Golden State Co. Ltd., of San Francisco. The new enriched milk, containing vitamins A, $B_1$, $B_2$ C, nicotinic acid and calcium pantothenate, was developed in the company's laboratories to provide a fortified food for men and women too busy to check their diets for vitamin intake.

## Asks US Milk Plants For Mushroom Towns

**Health coordinator would spend $10,000,000 to construct Federal pasteurizing units**

A PROGRAM which includes construction of $10,000,000 worth of government-owned and operated milk-pasteurization plants in defense "boom" towns has been put before Congress by the Coordinator of Health and Welfare and Related Defense Activities. Other projects included in the program are water supply, sewers, treatment plants, mosquito control, clinics and hospitals.

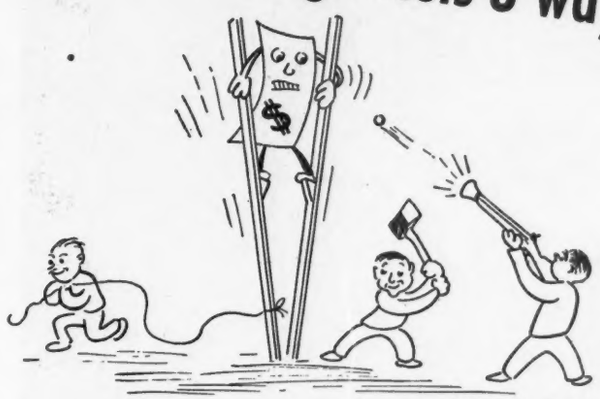
Pasteurization plants are projected for at least 25 localities in the Coordinator's program. Justification advanced for the government construction is that many defense "mushroom" areas are located where adequate facilities are not available and where the uncertainty of future need is considered to preclude private capital investment. No list of the proposed pasteurization sites has been decided upon pending outcome of the entire suggested program.

The Coordinator's program is involved in a inter-departmental battle for control of the proposed appropriation between Federal Security Agency and Federal Works Agency. However, it is considered likely that Congress will make available large sums of money for local projects in defense areas, part of which may well be earmarked for milk plants.

## "Area of Production" - Now "General Vicinity"

AMENDED REGULATIONS defining the term "area of production" were put into effect by the Wage-Hour Administration April 1. The new definition exempts, during the seasonal period, employes engaged in establishments employing ten or less workers and drawing all commodities from farms in the "general vicinity." There is no formal interpretation of the phrase, general vicinity.


Knock down high costs 3 ways at once!



MACHINE BUNDLING DOES IT

Three striking savings are offered by machine bundling—and many manufacturers are now taking advantage of them. If you operate cartoning or wrapping machines, the chances are that you can benefit, too, by modern bundling methods. From the very first day our bundling machine starts work in your plant, here's what happens:

**1. DOWN GO PACKING MATERIAL COSTS**
Using a strong kraft paper for bundling instead of costly made-to-order boxes makes an immediate saving of 60%.

**2. DOWN GO SHIPPING COSTS**
Paper for bundling weighs one-third as much as cardboard containers.

**3. DOWN GO LABOR COSTS**
One bundling machine handles the output of one or more cartoning machines, making important savings over hand packing.

We would like to send you complete information on our **NEW ADJUSTABLE BUNDLING MACHINE**

*Write for Literature*

PACKAGE MACHINERY COMPANY
SPRINGFIELD, MASSACHUSETTS

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Buenos Aires, Argentina: David H. Orton, Maipu 231
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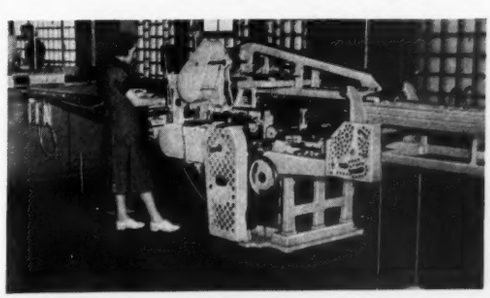
Melbourne, Australia: Baker Perkins, Pty., Ltd.



PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines

. . . . . but GOOD!

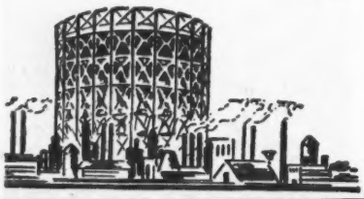
What price production, if rejects keep pace with the mounting tempo in your plant?

Kemp equipment has always been important to food men because it saved fuel. *Today,* in an impressive list of America's greatest food plants, Kemp equipment is regarded as *essential* because the underlying Kemp principle of complete premixing of gas and air makes possible a new *uniformity* in roasting, toasting, baking and can making.

Kemp equipment for your ovens and cookers means more than just maximum heat liberation, it means control of temperature, control of flame pressure, even heat distribution, hour after hour plus greater turn-down range.

If you are faced with the demand for more production, Kemp can help you get more speed . . . and less rejects. Ask men who work with Kemp equipment. They know it means faster . . . *but GOOD!*

Write, wire or telephone for details. Address The



**C. M. Kemp Manufacturing Company . . .**
**405 East Oliver Street,**
**Baltimore, Maryland.**

**KEMP of BALTIMORE**

# Field Ration System To Be Used by Army

### Will be given three-month trial. Change will aid procurement under mass purchasing plan

COMPLETING the fundamental changes in Army food procurement methods, announcement came during March that the garrison cash ration system will be substituted by May 1 with the issuance of food direct under the field ration system. The announcement said the field ration will be given a three-month trial, but there is every indication it will be permanent.

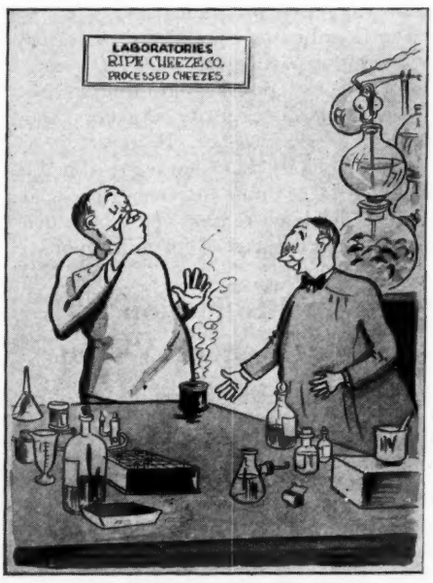
Institution of the field ration system is designed to provide the machinery for making effective the new mass purchasing procedure being set up by the Quartermaster Corps subsistence section in cooperation with OPM's procurement office. It simplifies the procurement problem all along the line.

Under the field ration system, Army units will be given a 15-day allotment of food, the allotment being fixed for each corps area, with variations to allow for local conditions and tastes.

The Army's field ration A is as nearly a duplicate of garrison rations as possible insofar as variety of foods is concerned. The ration list is presently being revised to include more items, particularly in the fresh vegetable field, as a prelude to starting the new system.

## Help Wanted on Defense

EVERY factory owner who believes he is equipped to handle a defense contract or subcontract should write or go to the regional office of the defense contract




"Wait till Joe smells the new cheese we named after him!"

service or the Federal Reserve or branch bank and list himself as available to help the defense effort.

This is a refinement of the broadening policy of spreading the British system of "bits and pieces" to American armament and munitions production.

Food manufacturers with machine shops can produce other items than food for defense.

# CAPITAL VIEWS

**AIDING DRAFTEES**—The Army would like to put competent draftees into Quartermaster Corps jobs. Food plant executives who are losing such men through Selective Service will aid both the man and the Army if they will make known the identity of such folks when they are called. It is always too bad to lose such a worker; but if he must go then he should be put at a job which will help most in feeding the Army properly. This is the attitude which government men would like to have food plant operators take. Letters on cases of this sort should go to Douglas C. MacKeachie, Office of Production Management, Washington, D. C.

**FOODS ARE FOURTH**—The demand for food to aid Britain will come in due time, but this need is probably about fourth in the sequence of urgency. Well ahead of it are the needs for ships, for airplanes and for ordnance material (everything from small arms ammunition up). This will make the need for food no less important, but the imminence of the demand is lessened to some extent.

**PLANNING THE PACK**—Great pressure is being brought to bear in Washington for early estimates as to the need for specific foods. For example, unless pea canners know soon how many canned peas are required, there will be danger of shortage.

The food industries must continue to press on this point. Otherwise, there will be neglect until the demand is imminent. Trade associations and some Washington spokesmen are doing their part, but the folks back home can also demand of their Congressman that he find out for them whether they should not schedule more business this year. And the schedule must take account of the four military needs—Army, Navy, British lease-lend and relief in other war-ridden foreign areas.

**LET'S SHOUT!**—Competition between government buying agencies means trouble for everybody. Washington is doing its best to avoid that complicating factor. They seek the help of industry. If buying by the Army, the Navy, the British and relief agencies like Red Cross threatens to run up the price on any commodity in any community, Washington would like to know of this promptly. The coordinator of purchases is Donald M. Nelson, Office of Production Management, Washington, D. C. Food industry executives will do a service to themselves, as well as to the government, if they point out unfortunate situations like this at an early stage. They will prevent the government from wasting taxpayers' money. They will protect the industry from a needless rise in prices, for which the industry is sure to be blamed regardless of the real cause.

**SHIP SHORTAGE**—Shortage of shipping space for American aid to Britain may largely affect the food business. The shorter haul from the United States to England may shift many normal supply lines, for example, canceling long hauls from South America and the South Pacific. If a ship can make three short round trips instead of one long one, it is just as good as having three ships on the longer route.

A second shift is also expected. The demand for food from the United States will be changed as to type of goods. Those foods which have the most feeding value per pound and give the most pounds per cubic foot of ship space will be chosen. The British wish that we could supply huge tonnages of dried vegetables and other concentrated foods as we do dried fruits. Fats and oils will also be sought both because of shortage in Great Britain and because of their concentrated food values.

**EXPORT LICENSES**—The first restriction on export of foods from the U.S. under the license system affects certain food oils and related fatty acids. Later, other food restrictions are expected, but not many, nor soon. Metals and chemicals make up the larger part of the export control lists. Food men are reminded of this in Washington when they "squawk" about government interference.

**FOOD ADMINISTRATION**—Not one, but two, varieties of "Food Administration" are expected in Washington soon. One will deal primarily with coordination of food buying, import and export. The other is supposed to program future food supply. Ultimately, we will doubtless have a streamlined modern equivalent of the Hoover food administration for our new war. The purpose will be coordination of food movement and economy in transportation far more than as a stimulant to primary agricultural activity. Many food men will, however, probably be surprised, perhaps shocked, by the speed with which apparent surpluses melt away when this country is called on to supply much of the British food need. And when the job of relief of starving areas is better mechanized, which may not come for a year or more, there will be demands prospectively beyond any previous American experience.

**FEDERAL CORPORATIONS**—As TNEC winds up its affairs, the distinguished Senator-chairman O'Mahoney again presses his proposal for Federal incorporation of companies doing interstate business. It will not be altogether surprising if such a system be given some Congressional attention under the guise of increased efficiency for national defense. Most any fad or "ism" can buy or rent such patriotic costume in order to secure attention and support.

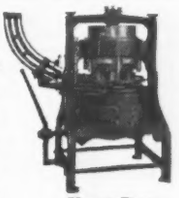

YOU PREPARE IT... WE'LL FILL IT!

The Sky's the Limit! No matter what the nature of your food products—pulps, liquids, pastes, soups, potted meats, syrups, etc., etc.—there are FMC Fillers designed to fill them *at top speed* with unerring precision into any size or shape jars, cans, bottles or other containers.

*M & S 6-Pocket Plunger Filler*

• This M & S 6-Pocket Plunger Filler, for example, is an extremely versatile machine that handles any liquid or semi-liquid product and fills any size or shape container.

The Heavy Duty Plunger Filler, below, is a positive measuring, plunger type machine built to meet the needs of year 'round canners. Easily adjustable for various size containers, this machine will operate continuously for from 20 to 24 hours a day without interruption.



*Heavy Duty Plunger Filler*

**NO SPOILAGE OR WASTE**

Unless a container is in position under the nozzle, none of the product will be released.

**SPEED**

These 6-Pocket Fillers will fill up to 125 average size containers a minute. Other FMC Fillers are available with capacities up to 250 or more containers per minute.

*Mail the coupon Now for information on the complete line of FMC Fillers!*

**FOOD MACHINERY CORPORATION** F-601-FI
**(Sprague-Sells Division) Hoopeston, Illinois**

Please send complete information on Fillers contained in your New 1941 Catalog.

Product to be handled_____

Sizes and kinds of containers_____

Speed required_____

Name_____

Company_____

Street_____

City_____ State_____

**Guard against deterioration!**

Variable, uncertain storage temperatures defeat the purpose of your cold storage rooms —they injure your reputation for quality.

With rugged JAMISON-BUILT Cold Storage Doors on guard, your products are safe. . . . . INSTALL THEM NOW! It will pay you!

Consult our nearest branch or address JAMISON COLD STORAGE DOOR CO., Hagerstown, Maryland.

*See details regarding our products on page 52 of* FOOD INDUSTRIES CATALOGS & DIRECTORY

*Jamison, Stevenson and Victor Doors*

JAMISON-BUILT Super Freezer Door described in Bulletin 126.

JAMISON-BUILT COLD STORAGE DOORS

# Butter Makers Take Pledge for Quality

**Set up seven-point program based on studies revealing factors which impair quality of butter**

ADOPTION of a participation pledge and authorization for employment of a coordinator to put an effective cream quality improvement program into operation resulted from a nationwide butter industry conference held at Chicago on March 20, under the sponsorship of American Butter Institute.

This conference grew out of the appointment last June of an ABI committee on cream quality under the chairmanship of H. C. Horneman, Sugar Creek Creamery Co., Danville, Ill. The committee arrived at conclusions that cream containing heavy mold growth gives butter with a high mold mycelial count, that methods used to separate cream from the milk have an influence on the quality of the cream, that sanitary conditions of the plants, receiving stations and farms affect cream quality, that the manner and method of washing cream and milk cans plays an important role, and that time of handling and the holding temperature are of particular importance.

Great emphasis was placed on the sanitation of all surroundings with which the cream comes in contact, on the time lag between milking and churning of the cream, on the temperature of the cream

## SCHEDULE OF EVENTS

**APRIL**

1— 4—11th Annual Packaging Exposition and Conference, Stevens Hotel, Chicago.
7—11—Agricultural and Food Chemistry Division, American Chemistry Society, St. Louis.
17—18—Tri-State Packers Association, Lord Baltimore Hotel, Baltimore, Md.
21—26—National Retail Bakers Week.
22—24—Pacific Northwest Bakers Conference, Multnomah Hotel, Portland, Ore.
25—26—Pacific Northwest Section, American Association of Cereal Chemists, Tacoma, Wash.
27—28—Rocky Mountain Bakers Association, Cosmopolitan Hotel, Denver, Colo.
28—30—Bakery Sales Association, Drake Hotel, Chicago.

**MAY**

5— 6—National Association of Flour Distributors, New Orleans.
11—14—Associated Retail Bakers of America, William Penn Hotel, Pittsburgh, Pa.
11—17—Carbonated Beverage Week.
18—20—New England Bakers Association, New Ocean House, Swampscott, Mass.
19—21—National Cottonseed Products Association, Roosevelt Hotel, New Orleans, La.
19—23—American Association of Cereal Chemists, Fontanelle Hotel, Omaha, Neb.
20—22—Biscuit & Cracker Manufacturers Association and Independent Biscuit Manufacturers' Co., joint conference, Drake Hotel, Chicago.
25—28—Southeastern Bakers Association, Lookout Mountain Hotel, Chattanooga, Tenn.

during the waiting period, and the use of an acid instead of an alkaline or neutral washing of cans and equipment.

Preparatory to the adoption of a participation pledge, a seven-point program was promulgated. It is:

1. Adherence to a rigid rejection policy for unfit cream.
2. Buying of cream only on a grade basis.
3. Speeding movement of cream from cow to churn.
4. Adoption of standard, easily cleaned containers.
5. Maintenance of clean, sanitary plant conditions.
6. Maintenance of clean, sanitary receiving stations.
7. Active participation in a cream-producer education program.

To implement this cream quality improvement program and the employment of a coordinator, authorization for pledging of funds and of participation, was made, regardless of membership in ABI.

Funds for the program are being raised on the basis of 12 cents per 1,000 lb. of creamery butter produced up to 10,000,000 lb. per year. Above 10,000,000 lb. assessment is 15 cents for 1,000 lb.

## Meat Institute Gets New Research Director

DR. HENRY R. KRAYBILL, head of the agricultural chemistry department of Purdue University, became director of the American Meat Institute's scientific research department on April 1. He succeeds Dr. W. Lee Lewis, distinguished scientist and educator, who had been AMI's director of research since the founding of the laboratory at the University of Chicago by Thomas E. Wilson in 1924. And he is internationally known as the inventor of "Lewisite," an effective warfare gas. Dr. Lewis was relieved of his duties as research head for AMI at his urgent request, because of ill health. He is retaining a connection with the Institute in an advisory capacity.

Dr. Kraybill is recognized in the United States as one of the foremost men in the field of agricultural chemistry. He has served as chairman of the American Chemical Society's division of agricultural and food chemistry, as president of the Association of Official Agricultural Chemists, as a member of the editorial board of the A.O.A.C. publications and as president of Association of American Feed Control Officials.

## Research on Dairy Products

WORK HAS BEGUN on a research program on nutritional values of dairy products, to be planned and supervised by the National Dairy Council at the request of the American Dairy Association. The first studies will be on butter fat; these will be preliminary to a proposed long-time program of research on all dairy products.

## Bill Cuts Peanut Acreage

LEGISLATION putting peanuts under the acreage allotment program of the Agricultural Adjustment Act is moving through Congress with support from growers, millers and shellers and at least partial support from commercial producers of edible products. The bill as revised in the House committee to incorporate changes proposed at public hearings provides for a 1941 acreage limitation of 1,610,000 acres, roughly a 15 percent reduction of the 1940 crop acreage.

## Apples Put to "Sleep" In Rubber Container

PUTTING FRUITS and vegetables to "sleep" in cold storage is the latest technic for preserving them. Dewey & Almy Chemical Co., Cambridge, Mass., has been experimenting with the technic. The apples are packed in latex bags, six to the package. The greater part of the air in the package is removed, and the fruit gives off sufficient carbon dioxide in its normal respiration to slow down the metabolism—enough to literally "sleep" during the months of cold storage. The latex wrapping is said to add about 1¼ cents to the cost of each half-dozen apples packaged in it.

This work is quite experimental, and more research is considered necessary before the method can be considered commercially practicable.

## St. Louis Gets Low-cost Milk

A PROGRAM to encourage increased consumption of milk among low-income families in St. Louis was announced today by the Surplus Marketing Administration. The program provides for daily home delivery of up to 39,000 quarts of milk to approximately 54,000 qualified relief persons. The milk will be sold to the relief agencies at 5 cents per quart by handlers participating in the program.

## Less Shortening Made

ONLY 1.2 billion pounds of fats and oils were used in the manufacture of shortenings in 1940, according to the Bureau of the Census. This is the lowest figure since 1933. The production of shortenings in 1939 required just over 1.4 billion pounds, while the all-time high of 1.6 billion pounds in 1936 was 35 percent greater than the 1940 figure. The low production of shortenings in 1940 is accounted for by the large supplies of lard available and the resulting low prices for all edible fats.


Hackney

DRUMS and BARRELS

HOW HACKNEY DESIGN AND CONSTRUCTION BENEFIT YOU

*Hackney Removable Head Welded Type Drum with I-Bar Hoops—and Toggle-tite closure.*

A Hackney Container is your assurance of maximum economy and satisfaction. The Hackney Removable Head Drum or Barrel assures the absence of all sharp corners and crevices which are so difficult to clean. The Toggle-tite closure, making an air-tight seal over the outward curve of the top of these Hackney Containers, prevents foreign matter from entering—eliminates the possibility of loss of contents.

HACKNEY DRUMS

assure longer life and extra durability. The special Hackney butt-welded bottom chime construction is exceptionally strong. There are no cracks or crevices. Being without recesses, it enables easy, positive cleaning. Ease of handling and strength of the container are increased by the hoops—either I-bar or integral can be furnished. Hackney Drums are made in both welded and seamless types.

HACKNEY REMOVABLE HEAD SEAMLESS BILGED BARREL

consists of a seamless shell with integral bottom, pressed and drawn to bilged shape. Cold-drawing increases the strength of the bilged sides to prevent denting, and eliminates hard-to-clean corners, crevices and joints.

*Hackney Removable Head Seamless Bilged Barrel — with bolt closure.*

There is a Hackney container for every requirement. They are made in capacities up to 110 gal. — furnished galvanized, tinned or black. A Hackney engineer will be glad to work with you in determining the container best suited for your needs. There is no obligation.

PRESSED STEEL TANK COMPANY

1349 Vanderbilt Concourse Bldg., New York
208 So. La Salle St., Room 1573, Chicago
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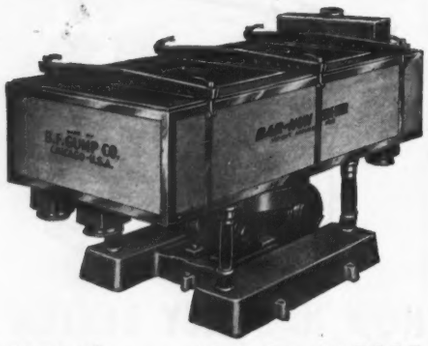
1457 So. 66th St., Milwaukee

*Containers for Gases, Liquids and Solids*

# UNIFORM . . . . . . CONTROLLED ..SEPARATIONS..



## With a BAR-NUN Rotary SIFTER

An involved, multiple-separation sifting job, or a scalping operation requiring a single separation, can both be taken in stride with a compact big-capacity Bar-Nun Rotary Sifter. The Bar-Nun excels at separating dry, powdered, granular or flaked products ranging from coarse to 200 mesh fines.

If yours is a single separation requirement, the Bar-Nun flow which provides for triple screen capacity from a single machine will be of extreme interest to you.

If you need multiple separations—you'll like the way the Bar-Nun provides full length cloth travel of the product over the lower sieves as well as the top one.

You'll also like the mechanical construction that provides complete rotary motion over the entire area of the screens; mechanical bearings throughout to provide smooth, continuous service; improved cloth cleaners that prevent blinding on some of the most stubborn types of material; and many other features that bring a worthwhile plus value to the Bar-Nun.

Send representative samples for a thorough sifting test. Recommendations, prices and complete information will be furnished without obligation.

***Food plant equipment***

As designers of food process plant equipment, we offer the services of our engineering staff to work with you and help modernize your grinding, sifting, mixing, weighing and packing operations.

***Catalogs on request***

**B.F.Gump Co**

***Engineers and Manufacturers Since 1872***

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Use of fats and oils in both margarine and "other edible products" (not including shortening) increased over the 1939 figures. The former at 256 million pounds represented a 6 percent increase, and the latter at 480 million pounds (an all-time high) was a 12½ percent increase.

A turn in this situation is likely to occur, as lard production in 1941 is expected to be lower while large shipments of lard to Britain in 1941 are possible. Already, vegetable oil prices are rising and prospects of a restricted cotton crop are likely to cause these prices to go still higher. Meanwhile, increased imports of some edible oils, particularly coconut oil, are under way.

## Food Industries Consume 40 Percent of all Sugar

STATISTICS compiled by the Census Bureau show that approximately 40 percent of the total sugar production of United States sugar refiners is used in the manufacture of food products in commercial factories. Food and beverages industries producing 98.3 percent of the nation's commercially manufactured foods and beverages, reported consumption in 1939 of 4,634,711,850 lb. of sugar valued at $211,622,920. Total output of refiners in that year was 11,983,459,800 lb. of refined, granulated and clarified cane, beet and corn sugars.

Sugar consumption reported by the food and beverage manufacturers included 3,246,632,650 lb. of cane sugar, 1,079,012,500 lb. of beet sugar and 309,066,700 lb. of corn sugar.

Among the branches of the food industries, bakery products used most sugar, confectionery and related products stood second, the canning and preserving industry was third, and the beverage industry was fourth.

## Wheat Backs Up

CONTINUED BLOCKADE of European wheat importing countries and increasing scarcity of ocean shipping have resulted in backing up wheat in the exporting countries until now exportable surpluses are the largest on record. In a recent report of Broomhall of London, the following figures for exportable surpluses were given:

| | |
|---|---|
| United States | 200,000,000 bushels |
| Canada | 676,000,000 bushels |
| Argentina and Uruguay | 196,000,000 bushels |
| Australia | 136,000,000 bushels |
| Other countries | 44,000,000 bushels |
| Total | 1,252,000,000 bushels |

This total compares to exportable surpluses of 1,048,000,000 bushels last season and 896,000,000 bushels in 1938–1939.

Estimates by Broomhall of shipments to be made in the complete 1940–1941 season total about 360,000,000 bu., compared to about 516,000,000 bu. in 1939–1940 and to 601,0000,000 bushels in 1938–1939.

## Sugar Price Rise Based On Shipping Conditions

RECENT RECOVERY in the prices of both refined and raw sugar have been based upon increasing scarcity of ocean shipping and prospects for even higher ocean freight rates, rather than upon any possible shortage of sugar itself.

This is borne out by figures recently released by the U. S. Cane Sugar Refiners Association, covering sugar stocks available on January 1, 1941, under the U. S. quota system, held by continental refiners, American insular areas, Cuba, the Philippines and Latin American exporting countries. These stocks totaled 4,427,000 tons, compared to 3,599,000 tons a year before and to 3,863,000 tons on January 1, 1939.

## Commodity Price Trend Continues Upward

DURING the period from February 15 to March 15 the general trend of commodity prices continued upward. The *New York Journal of Commerce's* weekly index of commodity prices rose from 82.6 to 84.1, while the same publication's index for grain prices rose from 64.1 to 67.8 and for food commodity prices from 70.1 to 71.3. In the same period, the *Business Week* index of business activity increased from 143.8 to 144.5; the U. S. Department of Labor's index for wholesale prices rose from 80.5 to 80.9, its index of food prices rose from 73.3 to 74.3 and its index of farm prices increased from 70.5 to 70.9.

Most spot prices for food products also rose during the month in question. Wheat, No. 2 dark winter, Kansas City, moved from 74¼c. to 83¼c., flour from $4.65 to $5.15, and corn, No. 3 yellow, Chicago, from 60¾c. to 63½c. Among

## Construction News

| | Pending (thousands) | Awarded March (thousands) | Total Awarded 1941 (thousands) |
|---|---|---|---|
| Bakery | $220 | $145 | $2,925 |
| Beverages | 595 | 312 | 2,858 |
| Canning and Preserving | 100 | 40 | 120 |
| Cold Storage Plants | 250 | ..... | 192 |
| Confectionery | ..... | ..... | ..... |
| Grain Mill Products | 695 | 150 | 1,177 |
| Ice Manufactured | ..... | ..... | 40 |
| Meats and Meat Products | 300 | 50 | 318 |
| Milk Products | 120 | 30 | 455 |
| Miscellaneous | 885 | 325 | 994 |
| | $3,165 | $1,052 | $9,079 |

the meats, beef fell from 18c. to 17c., lamb declined from 17½c. to 17c., but pork loins increased from 16½c. to 18c. Eggs increased from 17c. to 20c., while butter also upped, from 30¾c. to 31¼c. Among the imported foods sugar jumped from $3.00 to $3.35, cocoa from $5.90 to $7.55, and coffee from 8¼c. to 9c.

# INDICATORS

CONFECTIONERY and competitive chocolate products sales in January, 1941, based on reports to the Department of Commerce by 210 manufacturers, totaled $21,702,000, an increase of 8 percent over sales in January, 1940, but 16 percent below sales for December, 1940.

FLOUR PRODUCED in February, 1941, by mills producing 64 percent of the output of the United States, according to *The Northwestern Miller*, totaled 5,337,961 bbl., compared to 5,260,277 bbl. a year before.

MEAT PRODUCTION in 1940 is estimated at 18,802,000,000 lb., up about 9 percent over 1939 production and the highest output on record.

MEAT CONSUMPTION, per capita, in 1940, is estimated at 140.6 lb., the highest figure since 1925.

PEA ACREAGE for canning and freezing is this year expected to total 365,690 acres, up about 8 percent above the 338,990 acres planted last year.

CANNED FRUIT to the amount of 3,250,000 cases (No. 10's) is expected to be purchased by the Army and Navy from 1941 packs, according to George Livingston of the National Defense Advisory Commission.

CANNED VEGETABLES to the amount of 7,500,000 cases (No. 10's) are expected to be purchased by the Army and Navy from 1941 packs, according to George Livingston of the National Defense Advisory Commission.

GRAPEFUIT PRODUCTION during the 1940–1941 crop year is expected to total around 40,000,000 boxes compared to 35,175,000 boxes in the preceding season.

ORANGE PRODUCTION in the 1940–1941 season is expected to be 82,261,000 boxes, compared to 75,646,000 boxes in the previous crop year.

FROZEN FISHERY PRODUCTS in storage on February 15, 1941, totaled 71,333,000 lb., up from 62,622,000 lb. on February 15, 1940.

EVAPORATED MILK PRODUCTION in January, 1941, was reported by Agricultural Marketing Service at 171,609,000 lb., the highest January output ever reported, 8 percent over January, 1940.

BUTTER, creamery, production in January, 1941, was estimated by Agricultural Marketing Service at 136,450,000 lb., 6 percent above January, 1940, output and about 5 percent above the previous (1930) January record.

CHEESE PRODUCTION in January, 1941, was placed by Agricultural Marketing Service at 36,350,000 lb., a record for the month and 18 percent higher than the January, 1940, output.

MILK fluid, sold in January, 1941, was about 3 percent greater than in the preceding January, according to Milk Industry Foundation.

OLEOMARGARINE SALES in January, 1941, as indicated by sales of internal revenue stamps, were 36,710,870 lb., up about 15 percent over the previous year.

CHEESE CONSUMPTION, per capita, increased from 3.3 lb. in 1909 to 5.3 lb. in 1939, according to the Bureau of the Census.

EGG PRODUCTION in February, at 9,114,000 cases, established a new high record for the month.

FRUITS, frozen, in storage on March 1, 1941, totaled 114,705,000 lb., compared to 104,913,000 lb. on March 1, 1940, and to a March 1 average of 88,586,000 lb. in 1936–1940.

VEGETABLES, frozen, in storage on March 1, 1941, were 62,873,000 lb., compared to 61,397,000 lb. a year earlier.

BUTTER, creamery, in storage on March 1, 1941, amounted to 16,520,000 lb., compared to 18,366,000 lb. on March 1, 1940, and to an average in 1936–1940 of 32,242,000 lb. for the date.

CHEESE, all kinds, in storage on March 1, 1941, totaled 119,590,000 lb., compared to 83,050,000 lb., one year before and to an average of 86,572,000 lb. on March 1 in 1936–1940.

EGGS, case equivalent, in storage on March 1 this year equaled 1,587,000 cases. This compared to 1,169,000 cases on March 1, 1940 and to an average of 1,612,000 cases on March 1 in the years 1936–1940.

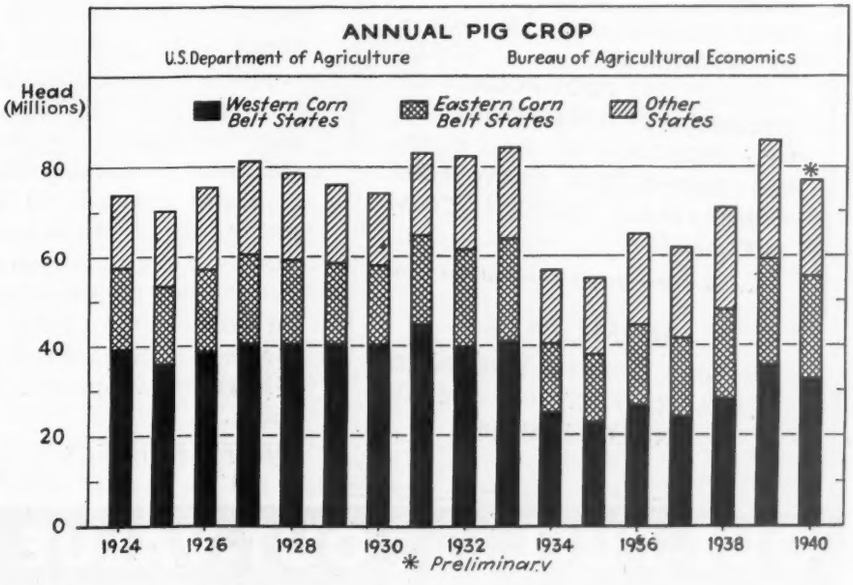
POULTRY, all kinds, frozen, in storage on March 1, 1941, totaled 163,347,000 lb., compared to 144,759,000 lb. a year before and to an average of 121,025,000 lb. in 1936–1940 for the same date.

MEAT, all kinds, in cure and frozen storage on March 1 of this year amounted to 982,685,000 lb. The figure a year before was 836,503,000 lb. and the average for the same date in 1936–1940 was 781,295,000 lb.

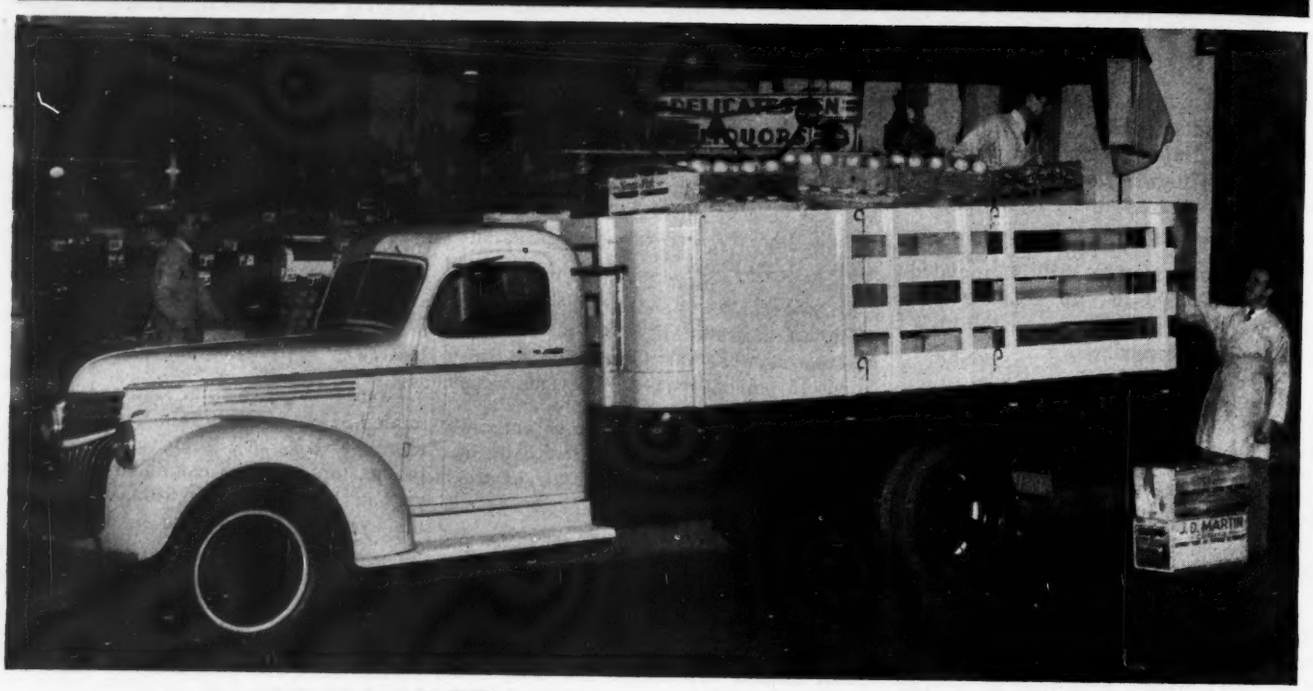
LARD IN STORAGE on March 1, 1940, totaled 317,451,000 lb. On the same date there was 8,391,000 lb. of rendered pork fat in storage. The combined figures a year earlier totaled 256,640,000 lb., and the average for the date in 1936–1940 was 156,020,000 lb.

WEEKLY WHOLESALE FOOD PRICE INDEX of Dun & Bradstreet, Inc., stood at $2.65 on March 18, 1941, up 4c. over the preceding week and comparing to $2.29 on March 19, 1940.

COST OF LIVING INDEX of National Industrial Conference Board for February, 1941, was 86.1 compared to 86.0 a month before and was 1.2 percent over the February, 1940, figure.



# Things sure do move when CHEVROLET TRUCKS go to work




*Inspect these*

**NEW 1941 FEATURES**

★ TWO NEW VALVE-IN-HEAD ENGINES . . . STANDARD: 174 FOOT-POUNDS OF TORQUE—90 HORSEPOWER . . . "LOAD-MASTER": 192 FOOT-POUNDS OF TORQUE—93 HORSEPOWER* ★ NEW RECIRCULATING BALL-BEARING STEERING GEAR ★ NEW, MORE COMFORTABLE DRIVER'S COMPARTMENT.

*Optional on Heavy Duty models at extra cost

**60 MODELS**

ON NINE LONGER WHEELBASES . . . A COMPLETE LINE FOR ALL LINES OF BUSINESS

## They have *EXTRA* horsepower . . . *EXTRA* pulling power . . . *EXTRA* earning power

There's a lot of work to be done in this country this year—more material to be moved, and moved fast; more goods to be delivered, and delivered on schedule; more supplies to be hauled, and hauled promptly.

It's a year for heavy duty trucks with extra power—and that makes it a year for Chevrolets, because they are the most powerful trucks in the low-price field.

There are full 90 horsepower and the tremendous *pulling* power of 174 foot-pounds of torque in Chevrolet's Standard engine. If you need more, there are 93 horsepower and 192 foot-pounds of torque—extraordinary pulling power for extraordinary duty—in the special heavy duty "Load-Master" engine, optional at a small additional charge.

Be ready for peak loads—with the trucks that can carry them.

CHEVROLET MOTOR DIVISION, *General Motors Sales Corporation*
DETROIT, MICHIGAN

**OUT-PULL . . . OUT-VALUE . . . OUT-SELL**

# Men, Jobs & Companies

## INDUSTRY

**Anheuser-Busch, Inc.,** St. Louis, has awarded contracts for a new $100,000 stock house, to be 60 ft. high, 91x98 sq.ft., of reinforced concrete and brick construction.

**Beech-Nut Packing Co.,** Canajoharie, N. Y., has withdrawn from the biscuit business for the time being, utilizing for storage space the biscuit section of its Rochester plant, where coffee and soup departments are located.

**Boston (Mass.) Molasses Co.** has started construction on a one-story 89x240-sq.ft. unit, estimated to cost $27,800, in South Boston.

**Campbell Soup Co.,** Camden, N. J., has signed a contract with the C.I.O. United Cannery, Agricultural Packing and Allied Workers, granting wage advances of 7½ percent to its 5,000 employees. The agreement provides for a five-day, 40-hour week, one-week vacations and time and one-half for overtime, but maintains an open shop.

**Crosse & Blackwell Co.** plans an extension to its Baltimore, Md., plant which will increase its space by 20,000 sq.ft. A large part of the addition will be used for manufacturing. The company has reopened offices and warehouses in Boston with H. C. Delano as manager.

**Davidson Bakery Co.** plans to construct a $50,000 addition to its plant in Portland, Ore.

**Fraser Valley Milk Producers Association,** Vancouver, B. C., has doubled production of evaporated milk for the British market.

**C. D. Kenny Co.,** Baltimore, suffered $200,000 damages in the fire which destroyed its establishment at Bristol, Va.

**Kroger Grocery & Baking Co.** has opened a new plant near Ft. Wayne, Ind., where it will produce "Tenderay" beef.

**Lockhart Creamery** has awarded contracts for construction of a $40,000 dairy products plant in Austin, Tex.

**Maggi, Inc.,** New York manufacturers of bouillon cubes and food seasonings, will build a plant in New Milford, Conn. The plant will include two 4-story units 100x200 sq.ft. and 100x180 sq.ft., at a cost of $300,000.

**Morgan Fishing Co.,** Terminal Island, Calif., has received bids for construction of a single-screw tuna fishing boat of welded steel, to cost between $821,000 and $824,000. The boat, complete with refrigerating equipment, will be one of the largest tuna vessels operating out of a United States port.

**GEORGE H. RUTHERFORD**

**National Dairy Products Corp. has elected him treasurer to succeed A. A. Stickler, who resigned last November. Mr. Rutherford, who was at one time associated with General Foods Corp., has been with National Dairy Products Corp. for nine years.**

**DR. E. H. HARVEY**

**Dr. Harvey, consulting chemist of Highland Park, Ill., has been elected 1941 chairman of the Midwest section of the Institute of Food Technologists. G. V. Hallman, Continental Can Co., is vice-chairman. In February Dr. Harvey started a graduate lecture course in Food Technology at Illinois Institute of Technology.**

**Old Virginia Packing Co.,** Front Royal, Va., is building a new plant to include a cider press, apple cannery and cold storage plant with a 600-bbl. capacity.

**P. F. Peterson Baking Co.,** Omaha, Neb., has acquired a site at Grand Island, Neb., for erection of a new $150,000 plant.

**Prince Macaroni Co.,** Lowell, Mass., has introduced a new product, noodle-vegetable soup, made of dehydrated vegetables and spice.

**Quaker Oats Co.,** Chicago, has purchased a substantial interest in patents held by American Dairies, Inc., for extraction of high-vitamin products from young grasses. The company has also acquired interest in the Greenmelk Co., Ltd., of Guelph, Ont., and has formed a new company, Cerophyl Laboratories, Inc., with headquarters in Kansas City, to continue research in grass products.

**Joseph Schlitz Brewing Co.** of Milwaukee is erecting a $50,000 addition to its office.

**Via-Foods, Inc.,** will construct a $35,000 plant in Jacksonville, Fla.

**Wilson & Co.,** Chicago, has contracted to build a $40,000 poultry and egg packing plant in Eagle Grove, Iowa.

**Wyoming County (N. Y.) Products, Inc.,** has completely rebuilt its plant, destroyed in November, and has installed the latest equipment for packing juices, sirups and fruits for the preserving trade.

## PERSONNEL

**Dr. C. H. Bailey,** head of the biochemistry division, University of Minnesota, has become consultant to the Millers' National Federation and the Wheat Flour Institute in respect to the "enriched flour" program and acts as chairman of the Federation's technical committee.

**William Callan,** National Milk Sugar Co., New York, has been elected president and director of the Milk Sugar Institute, Inc.

**Victor Conquest,** director of research, Armour & Co., Chicago, has been appointed chairman of the Second National Chemical Exposition to be staged by the Chicago Section of the American Chemical Society, Oct. 27 to Nov. 1, 1942.

**Russell L. Davis** will be the new plant superintendent for London Dry Ginger Ale Co., Wilmington, Del.

**Carl J. Gordon,** who has purchased the Arlington Canning Co., Shelbyville, Ind.,

**HARRY M. BIRSNER**

**Jacob Ruppert Brewery, New York, has named him production manager in addition to his recently acquired position of director of sales. Mr. Birsner was formerly president of Atlas Brewing Co., Chicago.**

plans to reopen the plant, idle since 1938, as soon as possible. He is connected with a Chicago packing plant but will operate the Shelbyville institution under his own name.

**Gwynne T. Hurrell,** sales manager for British Columbia Packers, Ltd., Vancouver, B. C., has been reported lost in the sinking of a British steamer while en route to England to check up on canned salmon conditions.

**Roy R. Irvin,** research chemist, National Grain Yeast Co., Belleville, N. J., has transferred his research work to Red Star Yeast Co., Milwaukee, Wis.

**John H. Kraft** has been elected president of Kraft Cheese, Ltd., Montreal. Charles H. Howell is chairman of the executive committee.

**John A. Martin** has been appointed chief of the perishable foods section of the subsistence and supply branch, OPM. With headquarters in the Chicago Quartermasters' Office he will serve as chief civilian adviser in reorganizing the Army's buying of fresh fruits and produce, fresh meats, poultry, eggs and dairy products.

**Harold W. McGhee,** formerly chief chemist for Michigan Bakeries, Inc., Grand Rapids, Mich., recently joined the technical staff of Doughnut Corp. of America at Elliott City, Ind.

**Dr. Karl A. Meyer** and **J. H. Brunwasser** of Chicago have purchased the long-established corn canning plant at Onarga, Ill. Several new buildings will be added and new equipment installed in the factory once operated by Standard Brands, Inc.

**John H. Reddy,** in charge of the sales development department of New England Confectionery Co., Cambridge, Mass., for the past five years, has been appointed a director. He is vice-president of Lovell & Covell Co.

**HOWARD J. HEINZ II**

**He has been elected president of H. J. Heinz Co., Pittsburgh, to succeed his father, the late Howard Heinz. At 32 he is third president of the firm, having served with the British organization, and as director and assistant to the president.**

**Royal Shawcross,** manager of A. A. Knights & Sons Corp., Malden, Mass., and 1940 president of the National Preservers' Association, has been made president of National Peanut Butter Manufacturers' Association.

**Tom Smith,** secretary of American Bakers Association since 1928 and of American Institute of Baking since 1931, has been appointed special adviser on procurement of bakery products, Division of Purchases, OPM.

**Gerrit J. Vander Hooning,** Grand Rapids, Mich., past president of National Retail Grocers Association, has been called to serve on the food procurement division of the U. S. Army's Quartermaster Department. He is a member of the national agricultural advisory committee and the retailers committee of the National Defense Commission.

**Maurice L. Wurzel** has been elected a director and president of Loft Candy Corp. to succeed Jack Beresin, now chairman of the executive committee.

## DEATHS

**Claiborne L. Andrews,** executive of Corn Products Sales Co., Inc., March 14, in South Richmond, Va.

**Samuel T. Brown,** 79, president of Brown Brothers Packing Co., Indianapolis, recently.

**Arthur I. Ellsworth,** 49, secretary of the advertising committee for the canned salmon industry, in Seattle, recently. At one time he operated canneries in Neah Bay, Anacortes, Anchorage and Port Ward, Alaska.

**Christ B. Eskilson,** 60, president of the Dixie Dairy Co., Gary, Ind., Mar. 5 in Bleecher, Ind.

**Walter F. Haas,** 65, president and general manager of Goebel Brewing Co., Mar. 1, in St. Louis.

**Edward Landsberg,** 73, president of U. S. Brewing Co. of Milwaukee and former president of the United Brewers' Industrial Foundation, on Feb. 20.

**Nels A. Nelson,** 56, Wanzer Dairy's Roseland plant superintendent, Feb. 15, in Chicago.

**Daniel Peterkin, Sr.,** 69, president of Morton Salt Co., Mar. 10, in Chicago. He was with the company 46 years.

**Emil A. Siebel,** 56, president of E. A. Siebel & Co., consulting brewery chemists, Feb. 28, in Oakland, Calif.

## ASSOCIATED INDUSTRIES

**Anchor Cap and Closure Corp.** was liquidated and dissolved as of March first, all its business and property being acquired by the Anchor Hocking Glass Corp. The company will be known as the Anchor Hocking Glass Corp., Closure Division, with headquarters in Lancaster, Ohio.

**Can Manufacturers Institute** has created a research division to conduct special studies of industrial, technical and marketing problems of common interest to can manufacturers and related industries. The division will be organized by Dr. Miller McClintock, technical director of the Advertising Research Foundation.

**Dairy Industries Supply Association** will hold its annual exposition Oct. 20 to 25 in Toronto, Canada. Harry L. Miller, Chester Dairy Co., has been reelected president of the association.

**Du Pont de Nemours & Co., Inc.,** has begun operation of its "Cellophane" plant at Clinton, Iowa. The 20-acre plant includes four principal buildings functioning as a continuous manufacturing operation to produce the transparent film.

**Fritzsche Brothers, Inc.,** has appointed Walter M. Eller as manager of its Cincinnati office to succeed his father, the late James R. Eller. Benedict F. Zimmer, vice president and western sales director of the company, died Mar. 16 in Chicago.

**Johns-Manville** has established a new industrial department office with headquarters in Atlanta, Ga., to facilitate service to the South. Thomas J. Roberts heads the new district.

**Monsanto Chemical Co.** is prepared to supply vitamin-enriched calcium phosphate to manufacturers of enriched flour.

**The Omaha (Neb.) Grain Exchange** has installed complete equipment for vitamin $B_1$ assay, and procedures are being perfected for others. The Omaha laboratory has led all grain markets in the country in installing vitamin assay equipment.

**Waukesha (Wis.) Foundry Co.** has acquired a new branch plant in Watertown, Wis., with 24,000 sq.ft. of floor space.

## Quality Control of Operations

(*Continued from page 40*)

proportions. In the experience of the senior author in the development of yeast cultures from single cells, success was realized in only 15 or 20 percent of instances wherein a single budding yeast cell was trapped under conditions most suitable for growth.

Of the raw ingredients purchased for the make-up of beverages, liquid sugar receives the most elaborate testing. Our concern is with the amount of sugar present, pH, color and chemical purity, as well as biological purity. Densities are determined by means of a Baumé hydrometer, one which had been found to give readings in agreement with both United States Bureau of Standard spindles and spindles employed by the sugar refining supply house. Color and chemical purity tests are made according to procedures described in the United States Pharmacopoeia for sucrose.

All incoming extracts are tested for absolute sterility before use. Observations for the presence of pectin-like matter and other foreign materials are made not only when received but also prior to use.

### *Judging Flavor*

A very important quality of beverages which must be maintained to the highest level is that of flavor. The determination of flavor, or the aroma and taste, is more in the realm of art than in the realm of science. Expert judges of flavors are more rare than are expert scientific authorities. It is, however, not altogether impossible to evaluate the ability of an individual to differentiate between intensities and tones of flavor. We have been able to train certain individuals to recognize qualities of specific types of tastes and aromas.

A successful method of training and discovering individuals with definite and sensitive organoleptic judgment involves repeated tests on two or three beverages with slightly different flavors. Judgments of individuals concerned are recorded daily, and by analyzing such judgments after 10 to 20 tests individuals with apparent natural or well-developed organoleptic senses can be detected.

A very important activity of our laboratory is fundamental research on any new product that is considered for commercial trial. Our usual procedures in testing new flavors involve the preparation of sirups simulating plant conditions and actual filling at the plant filler. Laboratory samples are then tested for flavor after various periods of shelf life and observed for chemical stability under varying conditions. Usually bottles are stored at room temperature, at ice-box temperature, at 28 deg. C., and at alternating ice-box and room temperature. A product which passes such a severe test for six weeks will generally find favor in the commercial market.

Very frequently we have found flavors to stand up well at room temperature but under the drastic test procedure described some misgiving is found. With fruit flavors, sedimentation of pectin-like bodies is not an infrequent occurence.

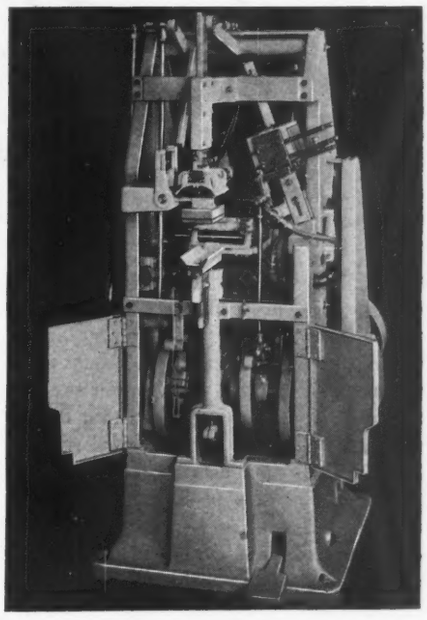
### *Importance of Bottle Washing*

Among practical bottlers, the stress on germicidal efficiency in bottle washing has been occasionally criticised. During the past ten years, Dr. Max Levine and co-workers at Iowa State College have repeatedly pointed out the absolute necessity of having practically sterile bottles. In our plant, this phase of processing is second to none in importance. On one occasion we had an immediate need of 12-oz. bottles to make up a laboratory batch. At that particular time we were not using the small bottle cleaning machine. We, therefore, cleaned the necessary number of bottles in hot soapy water and rinsed them thoroughly with sterile water. The bottles shined and glistened. However, the content of each bottle of experimental beverage was visited by microbial growth. A similar batch made under the same conditions wherein bottles from the bottle cleaning machine were used was prepared a few weeks later. Some of the bottles of the second batch were observed for over eight months and none showed any evidence of spoilage. This particular experience is cited for what it may be worth. It obviously contends that the stress on adequate sterilization of bottles can not be too great.

The principal laboratory functions relating to the quality control of operations in the beverage plant have been briefly considered. In addition to these functions the laboratory renders most useful service in the handling of numerous problems which arise from time to time. Among such problems are those of corrosion of metals, significant paint properties and chemical analyses of other beverages and certain types of flavors.

In concluding our treatment of quality control of operations in the beverage plant, we feed that our efforts in producing a high quality carbonated beverage are in line with progressive thoughts of other similar industries. Scientific control is not merely an accessory but an absolute necessity for production of uniform and high quality beverages.

LOOK INTO



THE WORLD
MODEL CH
SEMI-AUTOMATIC
LABELER

Here is a Labeler that is made to order for your glass pack. Note the ready accessibility of label holder, gum box and bottle stand . . . the compact, sturdy, construction . . . the simplicity of design — changeovers or adjustments may be made in a jiffy.

In addition to its operating convenience, the WORLD Model CH is extremely versatile. It applies labels from ¼ x ½" up to 6 x 6" to containers from tiny samples up to and including gallons.

For complete information on this adaptable, dependable WORLD Labeler write for Bulletin CH-8 or, better still, send us a complete set of your labeled packages.

ECONOMIC MACHINERY CO.
WORCESTER, MASSACHUSETTS

# Food Equipment News

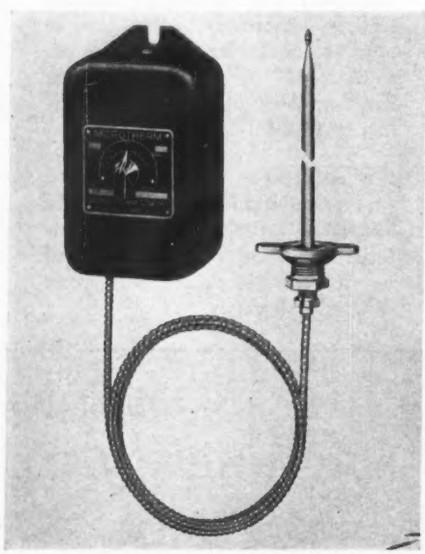
## Plastic Packing

CRANE PACKING CO., 1800 Cuyler Ave., Chicago, has brought out a new type of "Super-Seal" plastic packing. This is made with a patented tape back reinforcement vulcanized to the outer surface of the packing. It is claimed that due to this construction, a non-frictional surface bears directly against the moving parts, also that the new packing is extremely pliable and can be bent around small diameter rods and shafts or formed into small rings without distortion, fracturing or cracking.

A special grade of this packing, No. 4, is prepared for use by the food industries. This grade is non-metallic and contains no graphite. It can be used on stainless steel. The packing is available in sizes from ¼ in. to 1 in., graduated in sixteenths, in coils, standard length spirals, or die-formed rings or sets.

## Proportioning Control

BARBER-COLMAN CO., Rockford, Ill., has developed a remote bulb thermostat for proportioning control. Called the "Microtherm," this control is for use where a motor-operated valve or damper is to be positioned accurately and quickly in accordance with load variations. Applications include control for dryers, pasteurizers, cooking kettles, ovens, hot water tanks and air conditioning systems.



Proportioning control

New type plastic packing

The remote bulb and bellows assembly are hydraulically formed to provide uniform, maximum strength. The volume of liquid and conducting surfaces are balanced, to give a minimum ambient temperature effect. The bulb is furnished with a mounting flange suitable for either immersion or duct mounting. The mechanism is inclosed in a black, crinkle-finished metal case with tight fitting cover. Thermostats for two-position control (with snap acting contact), and for floating control are also available.

## Mixing Machine

AMERICAN MACHINE & FOUNDRY CO., 511 Fifth Ave., New York, have brought out the AMS Glen No. 340 mixer, designed to accommodate 85-gal. bowls, said to be the largest capacity vertical, planetary mixing machine ever constructed. This machine, designed for use in such industries as baking, candy manufacture and mayonnaise making, emphasizes such features as variable speed control, functional agitators suited to products being mixed, interchangeable bowls, planetary action, high power, and a wide flexibility for a variety of batch mixing operations.

Smaller models of 30 and 40-gal. capacity are also available.

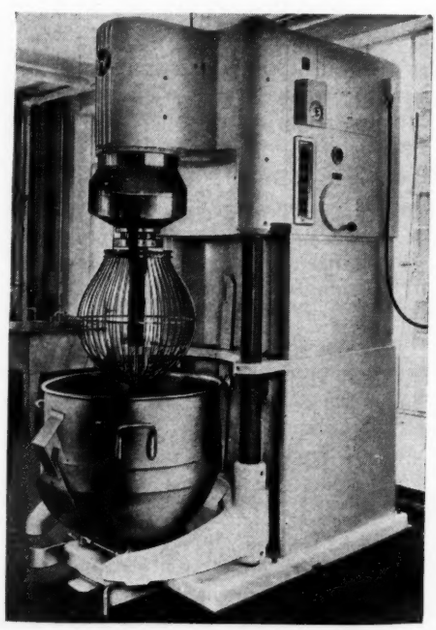
## Quick-Detachable Sheaves For V-Belt Drives

A NEW TYPE of V-belt driver sheave, designated as the QD quick detachable and quick demountable type, has been announced by Worthington Pump & Machinery Corp., Harrison, N. J. Simplicity of construction and suitability for any applications where quick mounting or dismounting are desired, are claimed for this sheave. It is said to eliminate the necessity of using a wheel puller to remove the wheel or hub from the shaft to get at the driving unit.

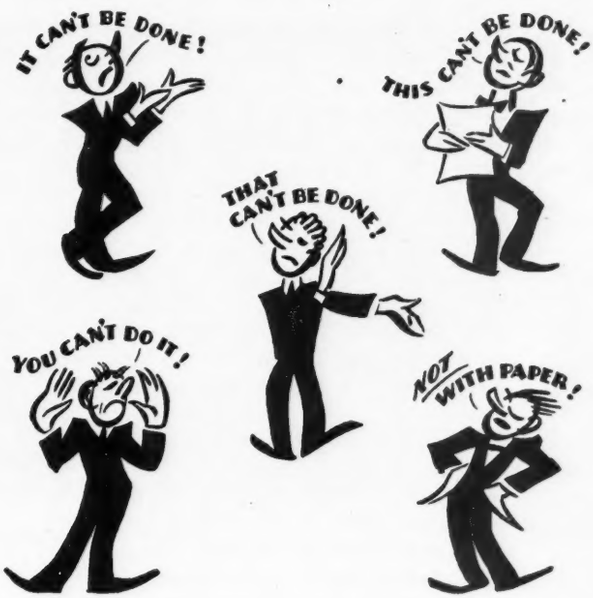
This sheave unit consists of two parts, a clamp-type hub and a V-grooved rim. The hub is clamped to the shaft by means of a cap screw in a flange, and is securely fastened by standard key way. The rim is taper-fitted to the hub and is fastened with three bolts. To remove the rim, these drawbolts are withdrawn and two of them are inserted in holes so tapped in the rim that the bolts act as jam screws and bear against the hub, thus forcing the rim off the taper without disturbing the position of the hub. This new type of sheave is available in the complete range of standard driver sizes.

## Waste Treatment

A. K. ROBINS & CO., INC., Lombard & Concord Sts., Baltimore, Md., are now making the Robins Chemical Proportioner for the treatment of water, sewage and food plant wastes. This proportioner works on an intermittent flow principle



Vertical, planetary mixing machine using 85 gal. capacity bowl.




# "What do you mean-it can't be done?"

For fifty-five years we have made a paper that can take so much punishment that people can still hardly believe it. It's called Patapar. Soak it in water as long as you will—it's strong as ever. Smear it with grease—it's resistant. Boil it—no failing. It stays unaffected, tasteless and odorless.

The food industry has long used Patapar in a big way. They wrap butter and cheese. They dress ham, bacon, frozen cuts, poultry in it. They use it for gaskets and milk bottle tops and in hundreds of ways.

They found that this is no ordinary material—Patapar stands up to jobs that seem impossible for paper.

## *Does this inspire you also?*

**Perhaps the next use for Patapar will be something that none of us has thought of. *You* know more about your needs than we do. But *we* know about Patapar. So, if we ought to consult together, write us. We'll gladly send test sheets of the size, weight and finish recommended for your purpose.**

**PATAPAR**
REG. U. S. PAT. OFF.
*Vegetable Parchment*

**PATERSON PARCHMENT PAPER COMPANY**
*Headquarters for Vegetable Parchment Since 1885*
Bristol, Pennsylvania

*West Coast Plant:* 340 Bryant St., San Francisco, Cal.
*Branch Offices:* 120 Broadway, New York, N. Y.
111 W. Washington St., Chicago, Ill.

and it is said that it will accurately deliver a measured quantity of chemicals to a measured quantity of water or waste. For example, it will accurately proportion lime, iron or alum and chlorine to the waste in order to coagulate and settle the suspended solids.

The proportioner operates by gravity, has few moving parts and requires no motor. The necessary power for operation is produced by the flow of water or waste into the weigh pans of the machine. All parts which contact the chemicals or waste are of non-corrodable material.

## Insulating Material

PACIFIC LUMBER CO., San Francisco, has developed a new process of flame-proofing for treating redwood bark fiber to make a fireproof heat-insulating material known as "Palco" wool. This product is particularly recommended by the manufacturer as a fireproof material for the insulation of cold storage rooms and quick-freezing equipment. It is also used in frozen food locker plants.

## Automatic Biscuit Machine

MOORE, INC., Atlanta, Ga., has put out the Turner Automatic Butter Biscuit Machine. This machine sheets the dough into any predetermined thickness, lays it in two layers and moves it to an automatic cutting device which cuts, picks up and places in the pan automatically three dozen biscuits at each stroke. The capacity is from 12,000 to 20,000 dozen biscuits per ten-hour day, depending upon the number of attendants. With three attendants the capacity is from 12,000 to 15,000, while with five attendants the capacity is from 15,000 to 20,000 doz. biscuits. The panned biscuits from the machine are ready to go to the proofer before baking.

In cutting the dough, this machine is said to produce a minimum of scrap. A cutting results in 75 percent of the sheets in biscuits and 25 percent in scrap which is immediately reworked so that there is no waste.

Floor space for the machine is 8x24 ft., including working space for the attendants. Construction is such that all parts coming in contact with the dough are of stainless steel and Monel metal. The outside finish is largely white enamel. Two ¾ hp. motors drive the machine, with controls located at convenient stations at the end of the inspection section which comes between the sheeting and cutting stations.

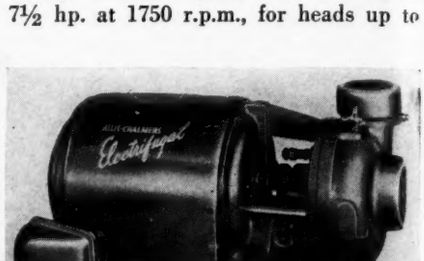
These machines are manufactured for Moore, Inc., by Potter & Rayfield, Inc., Atlanta, Ga.

Automatic machine for the manufacture of butter biscuits

## Pump and Motor Unit

ALLIS-CHALMERS MFG. CO., Milwaukee, Wis., is marketing the "Electrifugal" pump, an all-in-one centrifugal pump in which pump and motor are on one shaft and in one housing. This unit has a special motor with a one-piece cast iron motor yoke and pump bracket. Feet are cast integral with the housing and bracket and extend under the entire unit instead of under the motor only.

These units are available from 1 to 10 hp. at 3500 r.p.m., and from ¾ to 7½ hp. at 1750 r.p.m., for heads up to

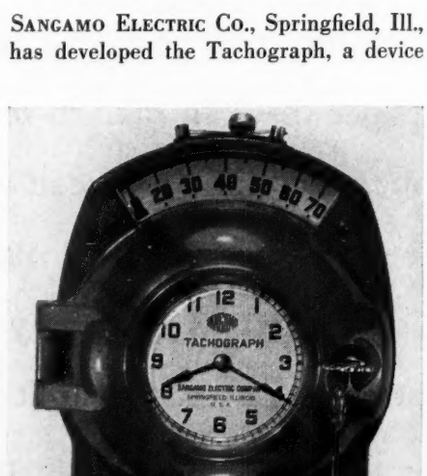



**Centrifugal pump and motor constructed as a unit.**

160 ft. The units are available in various metals suitable to the liquids being pumped.

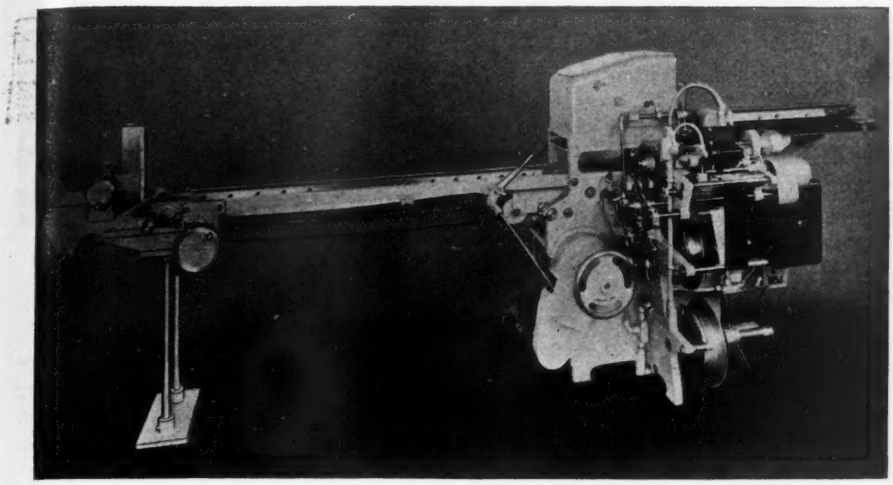
## Truck Service Recorder

SANGAMO ELECTRIC CO., Springfield, Ill., has developed the Tachograph, a device




**Service and speed recorder for installation on trucks.**

for recording the time of operation, speed of operation and distance operated by trucks. This device, which is supplied with a clock and speed indicator, is attached to the dash of the truck. It is equipped with a lock so that its operation cannot be tampered with. Inside the recorder a chart is mounted, giving a graphical record of the speed of operation, starts and stops, hours of operation, and the mileage traveled. The device is also equipped with a signal lamp which flashes to the truck operator when a pre-determined speed is exceeded.



Wrapping machine for candy bars

## Bar Wrapping Machine

PACKAGE MACHINERY Co., Springfield, Mass., has brought out a new type wrapping machine for candy bars. Designated as Model DF, this fully automatic machine is designed to wrap bars of either irregular or uniform shapes. It is equipped for quick adjustment over a wide range of sizes and, it is claimed, will wrap practically all types of bars, regardless of texture. When wrapping irregular bars, the folding parts of the machine can be adjusted for the maximum size in any particular run, resulting in wraps of uniform size. Adjustments of this nature are made by hand wheels and are said to require about 15 or 20 minutes.

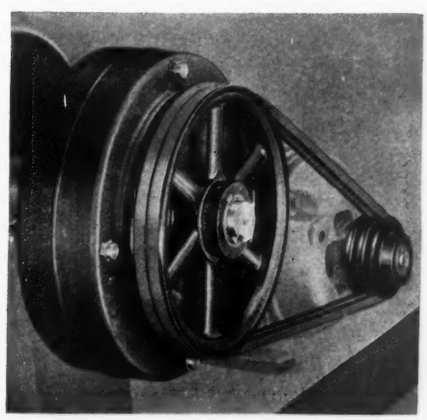
This wrapping machine may be equipped to use any type of wrapping material. Photoelectric control is provided for the accurate registering of printed material in roll form. When required, an automatic card feed is provided. Also, an inner lining can be applied if desired.

Because of its long, narrow shape, the Model DF is suitable for placing close to an enrober belt and parallel to it, thus saving floor space and making it easier for the operator to feed bars into the machine. Capacity of the machine is up to 125 bars per minute, depending upon the size and shape of the bar being wrapped.

## Speed Reducing Drive

AMERICAN PULLEY Co., Philadelphia, Pa., has brought out a new speed reducing drive consisting of two elements: a helical gear reduction unit, mounted directly on the shaft of the driven machine, and a standard belt drive between the motor and input shaft of the reduction unit. The unit itself has a standard fixed ratio of 13 to 1, any greater or lesser ratios being accomplished by means of the belt drive. For example, where an overall reduction of 52 to 1 is desired, a belt drive is selected with a ratio of 4 to 1. This ratio, in combination with the ratio of the reduction unit, delivers the desired speed.

Five models of this reduction unit, each with the same 13 to 1 ratio, cover all applications from ½ to 30 hp. This makes it possible to supply any desired speed between 11 and 215 r.p.m. with



New type of speed reducing drive

standard equipment. For speeds lower than 11 r.p.m. special units can be assembled.

The maker states that because this reduction unit mounts directly on the shaft, no space or expense for special foundations are required. Also, the shock-absorbing action of the primary belt drive protects the gears from shock loads and prolongs the life of the unit. Overall efficiency of the drive is stated to be about 98½ percent, when equipped with a tension control motor base.

## Flame Failure Protector

BROWN INSTRUMENT Co., Philadelphia, has announced the Protectoglo Photo-Electrode System for protection against failure of oil, powdered coal or gas flames. Operating on the photoelectric principle, this unit avoids the necessity of placing a metallic electrode in the high temperature flame, but retains the

Flame protective device operating on photoelectric principle.

quick response characteristic of thermionic systems. In operation, the presence of flame is detected by means of a photoelectrode system that is light sensitive. A sensitivity adjustment is provided to adjust the device to operate with flames of varying luminosity. To prevent transient flame disturbances from causing unnecessary shutdowns, the system is designed with a time lag which bears a direct relation to flame luminosity and the setting of the sensitivity adjustment. For a given sensitivity setting, the time lag will increase with an increase in light intensitivity of the flame. Similarly, if the light intensitivity remains constant, increasing the sensitivity will also increase the time lag.

This unit is supplied with a swivel mounting which can be screwed to a length of 1¼-in. pipe supported from the floor. The purpose of this mounting is to isolate the unit from the heat of the burner and furnace wall, thus reducing its operating temperature and increasing the life of the photoelectric elements. The mounting also provides a ready means for sighting on the flame. The unit is supplied for operation at 115 volts, 25 to 50 cycles inclusive.

## Aluminum and Tin Cleaner

A SPECIAL ALKALINE SILICATE CLEANER for aluminum, tin and alloys of either, has been announced by Philadelphia Quartz

SPEED-UP FILTRATION

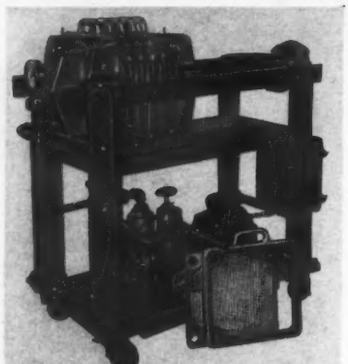


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PLATE AND FRAME
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Provide
Increased Flow Rates
Better Quality
Use of Any Filter Aids

The combination of any material of construction, any capacity and provision for the use of any type of filter aids or decolorizing agents under any conditions of required temperature and pressure sets up in Shriver Filters the production advantages of better, faster, filtration at low operating cost.

This applies whether the product be syrup, oil, wine, vinegar or scrap candy and the need be for 10 or 10,000 gallons of filtered fluid per hour.

Shriver Filters give what you need to improve product quality.

*Write for Bulletin 110*

T. SHRIVER & COMPANY
860 Hamilton St. Harrison, N. J.

SHRIVER FILTERS
Clarify—Purify
Recover By-Products
Faster—At Low Cost

Co., Philadelphia. Called "Metso 88 Special" it is said that the ingredients of this cleaner permit effective use in either hot or cold, hard or softened water. The cleaner is said to be a free rinser, going into solution immediately and being completely soluble, thus eliminating the danger of cleaning material settling to the bottom of a tank. The makers state that this cleaner quickly removes animal, vegetable or mineral oils as well as solid dirt from sensitive metal surfaces, providing a greater margin of safety than is available from many other cleaning materials.

This cleaner comes packed in concentrated liquid form, requiring only dilution before use. It is also useful in washing machines for various purposes and is said to be entirely safe for cleaning by hand.

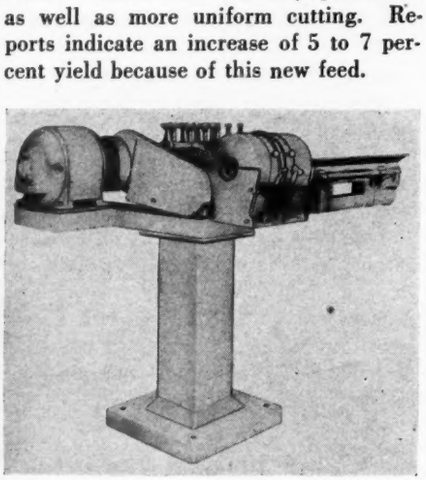
## Valves

A NEW COMPLETE LINE of standard iron body wedge gate valves for 125 lb. steam, 200 lb. cold working pressure, has been brought out by Crane Co., Chicago. This line includes both the brass trim and the all-iron pattern with outside screw and yoke or non-rising stem in sizes from 2 to 12 in. Also, the quick opening and the Underwriters' pattern, the alloy trim, the alloy cast iron valves for process work and the standard iron body valves for marine work are included in this line.

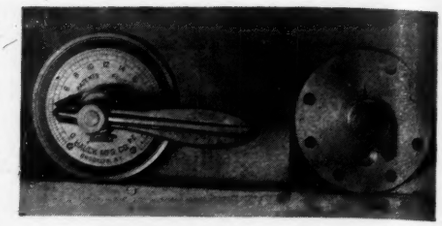
## Corn Cutter

SPRAGUE-SELLS DIV., FOOD MACHINERY CORP., Hoopeston, Ill., has developed a corn cutter in which a new type of rubber feed rolls replaces the conventional feed. In this cutter, two pairs of rubber rolls grip the ears, centering them more accurately than was possible with other designs.

It is said that the result is a saving in kernels which were formerly punctured as well as more uniform cutting. Reports indicate an increase of 5 to 7 percent yield because of this new feed.



Corn cutter with new type feed rolls.



Easily adjustable oil valve.

## Oil Valve

FOR USE in the regulation of oil flow where oil is used for fuel in heating ovens, dryers and similar equipment, Hauck Mfg. Co., 124 10th St., Brooklyn, N. Y., has developed the "Micro-Cam" oil valve. With this valve, flow can be regulated from zero to full opening in evenly graduated steps over less than one full revolution of the operating lever. The valve is provided with a dial and pointer to show the amount of opening. It can be arranged for either manual or automatic operation.

## Barrel Truck

BARRETT-CRAVENS CO., 3250 W. 30th St., Chicago, has brought out a new barrel truck designed for the safe handling of either full or empty, bilged or straight-sided barrels, drums or cylindrical fiber

Safety truck for handling barrels, drums or fiber containers.

containers. The truck is equipped with a double hook to prevent the load from falling off. The hook acts to aid the operator in tipping the barrel onto the truck and in holding the barrel while in transit. The truck is also equipped with steel legs so that it can be tilted back and will stand steady while loaded. The capacity is up to 800 lb.

## Dehydrating Unit

CARRIER CORPORATION, Syracuse, N. Y. is making an automatically operated self-contained dehydrator, operating on

the principle of removing moisture from air by absorption without the use of low temperature cooling. Listed as type 53C, this dehydrator employs silica gel, a substance capable of absorbing up to 40 per cent of its weight in moisture. The unit, which has been designed for use by manufacturers of candy and similar products where it is desired to maintain humidity conditions independent of temperature conditions, is available in four sizes. These sizes have air capacities from 450 to 3150 cu.ft. per min. They are designed to use either gas fuel or steam for reactivation of the silica gel.

## Lightweight Drive Chain

SAID TO WEIGH about one-half as much as the smallest power transmission chain previously designed, No. 88 roller chain recently announced by Diamond Chain & Mfg. Co., Indianapolis, was developed for services in which other roller chains are too heavy or bulky. The weight of this drive chain is 1¾ oz. per ft., its pitch is 8 mm. and its average ultimate strength is 1,100 lb. Among the applications indicated for this drive chain are the driving of timing mechanisms, control instruments and lightweight machinery.

## Protected Interval Timer

FOR SUCH APPLICATIONS as the automatic timing of dough mixers, R. W. Cramer Co., Inc., Centerbrook, Conn., has brought out its Model D2 interval timer designed for applications subjected to excessive moisture and dusty conditions. This is a standard self-starting synchronous motor-driven interval timer, inclosed in a specially built, dust-tight and splashproof cast aluminum housing, arranged for conduit connection and provided with a full-vision window and external setting knob. Front view bull's-eye light signals can be supplied if desired.

Dust- and moisture-proof interval timer


SUCCESSFULLY SOLVING PROBLEMS LIKE THESE... proves the value of Bemis Shipping Research

PROBLEM: Company losing business because product became lumpy.
(Lumping overcome and sales increased by new container "prescribed" after Bemis shipping research.)

PROBLEM: Moisture from air liquefied product which then caked.
(Bemis research provided proper protection and cut packing and shipping costs.)

PROBLEM: Product difficult to store due to moisture, bacteria and acid content.
(Overcome by Bemis research which also opened new market and lowered packaging costs.)

PROBLEM: Product lost weight in shipment.
(Better protection, resulting from Bemis research, prevented product from drying out and losing weight. Increased length of satisfactory storage.)

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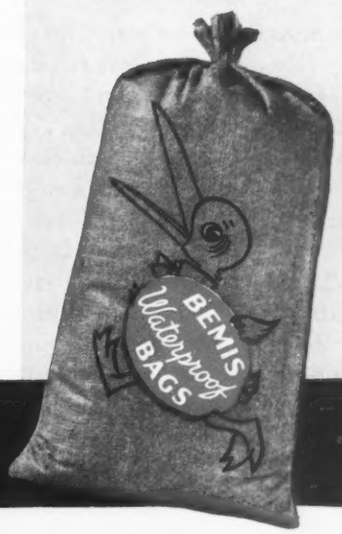
ODORPROOF, SIFTPROOF, DUSTPROOF, LINTPROOF, ACID AND GREASE RESISTANT . . .

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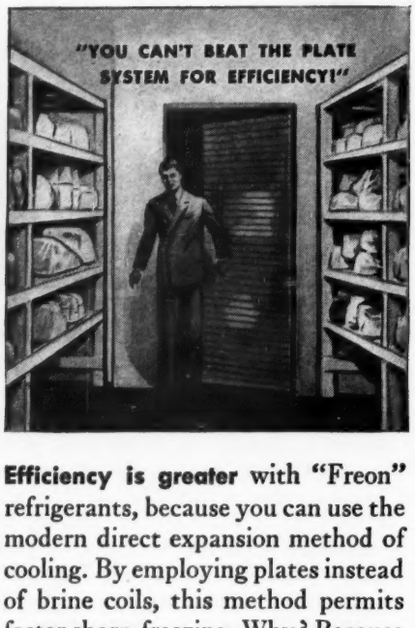
# A good start towards locker plant success

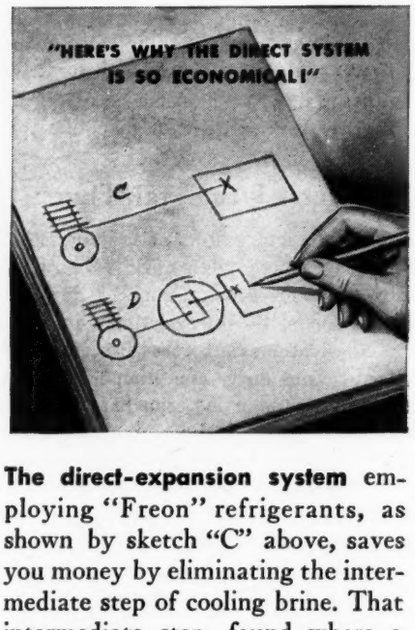
# ..."FREON"* REFRIGERANTS

THREE ADVANTAGES speed you on your way to locker plant success when you install cooling systems using "Freon" refrigerants. These advantages are: safety, efficiency and economy. Study these advantages—compare what you get with other systems—and you'll see why "Freon" refrigerants are ideal for locker plant operations!

**The most important** reason for choosing "Freon" refrigerants is their safety. Heavy losses can result even from tiny refrigerant leaks . . . causing spoiled meats, vegetables, fruits or berries. But not with "Freon" refrigerants! Because they are *completely harmless to food!* This quality of "Freon" refrigerants is often demonstrated by progressive locker owners to help them get new business. This safety feature will help *you* convert visitors to enthusiastic customers!




**Efficiency is greater** with "Freon" refrigerants, because you can use the modern direct expansion method of cooling. By employing plates instead of brine coils, this method permits faster sharp-freezing. Why? Because food resting on pipes gets only a fraction of the cooling contact obtained by food in direct contact with the plate. Thus, you can use a smaller sharp-freezing room to handle a given amount of food. That means less operating expense, and more locker space to produce income.




**The direct-expansion system** employing "Freon" refrigerants, as shown by sketch "C" above, saves you money by eliminating the intermediate step of cooling brine. That intermediate step, found where a secondary system is used, often steps up power costs as much as 25%. Direct expansion systems employing "Freon" refrigerants also eliminate the cost of brine coolers, pipes and pumps. You avoid the high costs of keeping brine at low temperatures, and simplify defrosting problems.

**▶No wonder so many locker owners insist on compressors using "Freon" refrigerants. The more you investigate, the more you'll be convinced there's only one choice for locker plant use—"Freon" refrigerants!**

** "Freon" is Kinetic's registered trade mark for its fluorine refrigerants.*

KINETIC

**FREON**

REG. U. S. PAT. OFF.

*safe refrigerants*

**KINETIC CHEMICALS, INC., TENTH & MARKET STREETS, WILMINGTON, DELAWARE**

# Just off the Press

## BOOKLETS • LITERATURE • BULLETINS

### *Food Plant Equipment*

**Cooling and Heating Equipment**
Fan-type cooling and heating equipment for dairy products manufacture, designed to permit cooling liquid products to extremely low temperatures while using high ammonia back pressure, are discussed in Bulletin 39-D of Jensen Machinery Co., Inc., Bloomfield, N. J.

**Drying Lamps**
Radiant heat lamps for use in industrial drying and heating installations are described in Booklet A-3817, issued by Westinghouse Lamp Div., Westinghouse Electric & Mfg. Co., Bloomfield, N. J.

**Heat Equipment**
Heating equipment of various designs for use in the heating of tanks, kettles and other equipment, made from tantalum, an acid-resisting metal, is the subject of an 18-page illustrated bulletin issued by Fansteel Metallurigcal Corp., North Chicago, Ill.

**Industrial Trucks**
"How To Save Money, Handling Your Loads" is the title of a bulletin describing seven typical steps common to most plants in handling industrial loads by means of electric industrial trucks, published by the Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland, Ohio.

**Leather Products**
Leather transmission belting and leather gaskets and packing are described in illustrated bulletin A-116, published by Alexander Bros., 406 N. 3rd St., Philadelphia, Pa.

**Materials Handling**
"Materials Handling Handbook" is the title of a 56-page illustrated manual on the use of electric storage battery trucks in industrial plants, issued by the Industrial Truck Statistical Association, 208 S. LaSalle St., Chicago.

**Materials Handling Equipment**
Many types of cab controlled, motor driven "Grabs" for use with overhead monorail handling equipment are described in an 8-page illustrated bulletin, Form 2005-A, of Cleveland Crane & Engineering Co., Wickliffe, Ohio.

**Merchandising**
"Ways to Sell More Canned Meats" is the title of an interesting bulletin, profusely illustrated in color, recently published by American Can Co., 230 Park Ave., New York City.

**Refrigeration Compressors**
Vertical two-cylinder type refrigeration compressors with roller bearings, in sizes 5x5 in. and smaller, are described in Bulletin C-1100-B11, published by Carbondale Div., Worthington Pump & Machinery Co., Harrison, N. J.

**Refrigeration Equipment**
In Bulletin C-1100-B12, the use of centrifugal refrigeration equipment in air conditioning and industrial applications is discussed by Carbondale Div., Worthington Pump & Machinery Corp., Harrison, N. J.

**Refrigeration Equipment**
Evaporative condensers, Types 9Q6 and 7, and 9S6 using Freon-12, for condensing refrigerant gases by evaporation are described with specifications in Bulletin CR-162, 163 and 165 of Carrier Corporation, Syracuse, N. Y.

**Rotary Dryer**
Operation and application of the "Roto-Louvre" rotary dryer for use on grain products, other food products and food factory byproducts, form the subjects of illustrated Catalog 1711, issued by Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill.

**Sifting Equipment**
Heavy duty gyratory low head sifters for use in such industries as flour milling, candy manufacturing and baking, are described together with installation data in illustrated bulletin B-6124, published by Allis-Chalmers Mfg. Co., Milwaukee, Wis.

### *Plant Supplies*

**Air Conditioners**
Unit air conditioners, Type 39Q and 39R, are described with specifications in two illustrated data sheets issued by Carrier Corp., Syracuse, N. Y.

**Air Washers**
"Clean Fresh Air" is the title of Bulletin 3142-A describing air-washing equipment and its application, and giving specifications, issued by Buffalo Forge Co., Buffalo, N. Y.

**Ball Bearing Units**
"Sealmaster" permanently sealed, pre-lubricated, self-aligning ball bearing units are illustrated, with specifications and descriptions, in Catalog 840, Stephens-Adamson Mfg. Co., Aurora, Ill.

**Clutches**
Data covering standard types and expanding ring types of friction clutches for light-powered drives are given in a recent catalog of the Carlyle-Johnson Machine Co., Manchester, Conn.

**Corrosion-Resistant Valves**
The "Vulcalock" valve, designed for handling corrosive and abrasive fluids under various conditions, is described in Catalog Section No. 9787, The B. F. Goodrich Co., Akron, Ohio.

**Corrosion-Resistant Concrete**
The use of Lumnite concrete for resistance to waste in dairy and packing plant construction is described with details for the construction of floors, drains and foundations in a recent bulletin published by the Atlas Lumnite Cement Co., 135 E. 42nd St., New York.

**Heat Insulation**
Blanket insulation, laminated for greater strength and better insulating efficiency, for flat and curved surfaces, at temperatures up to 1200 deg. F., is described in Bulletin No. I-64, published by Refractory and Insulation Corp., 381 Fourth Ave., New York City.

**Lubricants**
A line of specially developed "Lubriplate" lubricants for industrial machinery is described in a catalog entitled "Lubrication, the Prime Essential of Industry," issued by Fiske Bros. Refining Co., Newark, N. J.

**Transmission Belting**
"Hiphlex Transmission Belting" is described in Catalog Section 2100 of B. F. Goodrich Co., Akron, Ohio.

**Unit Heaters**
Gas-fired unit heaters, including fan types, blower types and duct types, are described in catalog U41 issued by Reznor Mfg. Co., 134 James St., Mercer, Pa.

### *Packaging*

**Closures**
Molded plastic bottle and jar closures are among the plastic products described in a 32-page bulletin, illustrated in color, published by Bakelite Corp., 30 East 42nd St., New York City.

## *Laboratory Equipment*

**Laboratory Equipment**
A precision balance, for the rapid and accurate determination of the weight of small objects, is described in Catalog 4540 issued by Roller-Smith Co., Bethlehem, Pa.

**Laboratory Equipment**
The Waco Catalyst, Vol. 5, 1941, describes, with prices, a line of laboratory equipment and supplies handled by Wilkens-Anderson Co., III N. Canal St., Chicago, Ill.

**Microscopes**
Various types of stereoscopic microscopes and their applications in laboratory operations are described and illustrated in a recent 16-page bulletin issued by Spencer Lens Co., Buffalo, N. Y.

**Optical Equipment**
The Hilger photometric color comparator, an abridged spectrophotometer, with a description of the Hilger photometric amplifier, are the subject of Hilger Bulletin SB 289, distributed by Jarrell-Ash Co., 165 Newbury St., Boston, Mass.

## *Control Equipment*

**Control Equipment**
The "Solu-Bridge", a solution tester for determining the strength of caustic solutions in bottle-washing equipment, is described in an illustrated folder issued by Industrial Instruments, Inc., 156 Culver Ave., Jersey City, N. J.

**Flow Meters**
In Catalog No. 2007, electric flowmeters for the measurement and control of fluids flow, together with schematic diagrams for the installation of this equipment, are presented by the Brown Instrument Co., Wayne & Roberts Ave., Philadelphia, Pa.

**Liquid Level Meters**
Indicating and recording instruments for measuring the level of water, oil and other liquids, of both mechanical and electrical types, are described with application data in Publication 2990 of Cochrane Corp., 17th and Allegheny Ave., Philadelphia, Pa.

**Temperature Control**
Photoelectrically balanced recorders, indicators, and controllers for temperature are illustrated and described with specifications in Catalog No. 1101F of C. J. Tagliabue Mfg. Co., Park and Nostrand Aves., Brooklyn, N. Y.

**Variable Speed Controls**
"How to Speed Up Production with Variable Speed Control" is the title of a 24-page illustrated bulletin giving 36 examples of the use of variable speed controls in industrial plants, published by Reeves Pulley Co., Columbus, Ind.

## *Miscellaneous*

**Corrosion Proof Coating**
In an illustrated booklet of 16 pages entitled "Americoat—Plastic Coating", the use of pliable plastic coatings for the protection of the surfaces of equipment and other apparatus from corrosion, particularly in food plants, is described by American Concrete & Steel Pipe Co., Box 3428, Terminal Annex, Los Angeles, Calif.

**Flavoring Materials**
Essential oils, oleo-resins, and flavor bases are among the products listed with prices in a recent wholesale price list issued by Dodge & Olcott Co., 180 Varick St., New York City.

**Flavors and Colors**
A new wholesale price list of flavors, essential oils and colors has been issued by Fritzsche Bros., Inc., 76 Ninth Ave., New York City.

**Paint**
"The Right Paint for Your Plant" is the title of a 14-page illustrated bulletin discussing the advantages of using "Barreled Sunlight" white paint for painting industrial plant interiors, published by U. S. Gutta Percha Paint Co., Providence, R. I.

**Rubber Equipment**
Hose, couplings, and packing for use in breweries, wineries, dairy plants and similar food industries, are described and illustrated with specifications in a 34-page catalog entitled "Rubber Products for Industry" published by Hewitt Rubber Corp., Buffalo, N. Y.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•NO LARGE LUMPS
•NO SHARP SLIVERS in
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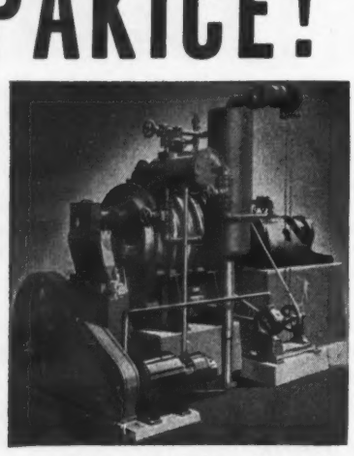

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## How to Measure Liquids

(*Continued from page 42*)

the tank, providing the total length of the *same slope* is substituted for "vert. inside height of tank" in evaluating the foregoing expression. For similarly shaped tanks coming to a point at the *top*, the simplest way to compute the volume of liquid therein is to use the last formula to find the volume of the *empty space* at the top of the tank, and then subtract this volume from the known total capacity of the tank.

The volume of liquid in a *hemispherical* or *spherical* tank is given by the expression:

$$\text{Vol. of liquid} = H^2 \times (1.5708 \times I.D.) - 1.0472 \times H^3$$

where $H$ = vert. height of liquid and $I.D.$ = inside diameter of top of tank. Here again a combination of constant factors for a given tank permits some simplification.

Tanks having *vertical sides* with a *pyramidal, conical* or *hemispherical* bottom may be considered as combinations of two tanks. When the liquid level is *below* the bottom of the vertical-sided portion, the volume of liquid is obtained directly by one of the last two expressions; when the liquid level is *above* the bottom of the vertical-sided portion, the volume in the vertical portion is found from Table II ($H$ = the height of liquid in the *vertical portion* only), and to this is added the known *constant volume* held by the *whole* of the sloping or hemispherical bottom portion.

The use of *horizontal cylindrical* tanks is common in commercial practice. Determination of the volume of liquid in such a tank when partially full is not simple unless a table, chart, or pre-calibrated gage specifically prepared for the tank in question is available. Table III is a generalized table prepared specially for this article to give the volume of liquid ($V$) in *any* horizontal cylindrical tank (with flat ends) as a *ratio* of the *total capacity of the tank* ($C$), when the vertical height of liquid ($H$) in the tank is expressed as a *ratio of the inside diameter of the tank* ($D$). For brevity, the table closes with $H = \frac{1}{2}D$ since it may readily be completed by subtracting the successive ratios (commencing with the second last) from 1. Thus, for $\frac{H}{D} = 0.51$ (*i.e.*, $1 - 0.49$), the corresponding ratio of $V$ to C is 0.51273 (*i.e.*, $1 - 0.48727$). A column of "differences" is given for ascertaining ratio values lying between those shown. Thus, if a tank is three-eighths full (*i.e.*, $\frac{H}{D} = 0.375$), the corresponding ratio of $V$ to $C$ is very closely 0.34252 (*i.e.*, 0.33636 + ½ of 0.01233).

The use of Table III may be exemplified by assuming that a horizontal cylindrical tank 6 ft. long, with flat ends and an inside diameter of 4 ft., contains 19¾ in. depth of liquid. Considering the tank for the moment as an upright cylinder of internal diameter $D = 4$, completely filled with liquid to height $H = 6$, its *capacity* (from Table II) will be $0.7854 \times 4^2 \times 6 = 75.40$ cu.ft. (or 564.0 U. S. gal., from Table I). The ratio $\frac{H}{D}$ in the horizontal tank is 0.4115. From Table III, the ratio $\frac{V}{C}$ is found to be 0.38791 with the aid of the column of differences. Therefore, the volume of liquid in the tank is

$V = 0.38791 \times C = 0.38791 \times 564.0$ U. S. gal. = 218.8 U. S. gal.

Since $D$ and $C$ are constants for a given tank, various devices based on the data in Table III may be employed for facilitating the calibration of such tanks. Figure 1 is a graph of the data of Table III in its complete form.

The volume of liquid in a *horizontal cylindrical tank* with *hemispherical ends* may be found by considering the tank as a combination of a horizontal cylinder with *flat* ends and a sphere of the same internal diameter, both filled to the same vertical height. The two separately determined volumes are then added.

The data in Table III (or Fig. 1) also allow the determination of volumes of liquid in *horizontal tanks* with *elliptical vertical cross section*, providing these have flat ends and are so mounted that *either* the shortest or longest internal diameter $D$ of the elliptical cross section is vertical. In finding the ratio $\frac{H}{D}$, the height $H$ of the liquid must be measured along the vertical diameter $D$. The standard capacity $C$ of the tank is found from Table II by considering the tank for the moment as an uprighted elliptical cylinder. In this position, the inside length of the tank now becomes $H$ in Table II, and $D$ above now becomes either $A$ or $B$; whichever is the case, the other inside diameter $B$ or $A$ must be measured.

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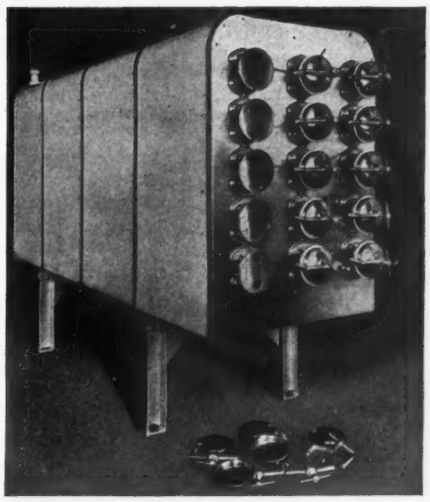
*Part II of this article will be published in the May issue of "Food Industries."*—THE EDITORS.


# CHESTER

## *Ammonia Cooled Internal-Tube Coolers*



solve many mechanical problems—particularly serviceable in pre-cooling before storage tanks, or directly into transportation tanks.

Designed for use with patented York ammonia liquid circulating system which maintains constant back pressure on ammonia to prevent freezing. Sanitary all stainless steel construction. Heads easily removed for cleaning.

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# Food Technology

## NEW DISCOVERIES & INVENTIONS

### FOOD TECHNOLOGY

#### *Pasteurization vs. Filtration For Sterilizing Grape Juice*

COMPARISON of cold (Seitz filter) sterilization and pasteurization of unfermented grape juice indicates that pasteurization is the *milder treatment* of the two, even though it is carried out at a higher temperature! The sterilizing filter is effective only in preclarified juice if the operation is to be commercially practical. If the gelatine or gelatine:tannin method of clarification is followed, part of the pectin is sacrificed along with the solids and colloids which cause turbidity. The enzyme method also destroys pectin. Even in clarification, by filtering through diatomaceous earth and asbestos, some of the pectin is retained by absorption.

Pasteurization is effected by heating 30 minutes at 65 deg. C. to destroy mold spores and fermentation organisms. This is usually done after bottling the juice. Another method is flash heating at 72 deg. C. for 20 seconds followed immediately by bottling and cooling in the bottles over a 30-minute period to 65 deg. C. Since the operation requires little time, it is not customary to add sulphur dioxide as a preservative as is commonly done in cold sterilizing. Hence, pasteurized grape juice, in addition to retaining its pectin, is free from sulphur dioxide. Cold-sterilized juice is superior in clarity and sparkle, but these eye-catching features are gained only at the expense of a sacrifice in quality. The popular demand for clear sparkling juice is comparable to the demand for snow-white flour, which can be made only by sacrificing quality.

Digest from "Unfermented Grape Juice and Methods of Making It," by Erich Eckstein, *Ernährung* 5, 207, 1940 (Published in Germany).

#### *Composition of Wood Smoke*

ACRID ODOR and flavor in fish smoked in an experimental kiln led to a study of wood-smoke composition in search of the factors making the experimental product inferior to commercially smoked fish. Smoke was generated from oak sawdust in an experimental kiln at three draft speeds, namely 400, 800 and 1200 cu.ft. per hour. At 800 cu.ft. per hour the smoke contained less formaldehyde, higher aldehydes and resin but more formic, acetic and higher acids and more methanol, phenols and total tar than with the faster or slower draft.

Tests with these smokes in drying and preserving fish indicated that the compounds responsible for the desirable flavoring and preservative effects of wood smoke are the more stable compounds normally formed in dry distillation of wood. These compounds also persist, though in different proportions, in the smoke from wood smoldering in air. They include resins (probably formed by condensation of formaldehyde with wood-tar phenols) which help to impart the desirable gloss to smoked fish. There are also aldehydes and ketones, but no esters were found in the smoke. Smoke formed by dry distillation of wood (no air draft) is richer in phenols and aliphatic acids than smoke from wood smoldering in air. Hence dry distillation is undesirable in smokehouses, since the phenols and acids tend to impart strong, acrid flavors.

Digest from "Study of Chemical Composition of Wood Smoke," by A. E. J. Pettet and F. G. Lane, *Journal of the Society of Chemical Industry* 59, 114, 1940 (Published in England).

#### *Cocrystallization Speeds Solution Rate*

SIGNIFICANT new information about meat-curing salts has been obtained by x-ray and microscopic studies of sodium chloride, sodium nitrite and sodium nitrate in mechanical admixture and in cocrystallized blends. It was found, for example, that when the three salts are cocrystallized either from a melt or a solution and powdered to pass a 200- or 300-mesh sieve, the powder dissolves 10 to 15 times faster than a powder of like grain size prepared by grinding the three salts together. With no more than 10 to 12 percent of sodium nitrite and nitrate in the blend, there is very little solid solution, but almost complete inclusion of nitrite and nitrate within the sodium chloride crystals. Although sodium chloride is isotropic and the other two salts are anisotropic, they display a remarkable capacity for crystal growth of one salt on planes of another. This sets up a state of strain in the crystal, which accounts for the high velocity of solution. Particularly rapid solution and high degree of nitrite and nitrate inclusion were achieved by drying a 25 percent solution of the blended salts on a steam-heated, chrome-plated drum rotating slowly while partly immersed in the brine.

Digest from "Application of the System Sodium Chloride; Sodium Nitrite; Sodium Nitrate to Meat Curing," by G. L. Clark and Lloyd A. Hall, *Industrial and Engineering Chemistry* 33, 98, 1941.

#### *Effects of Waxing Apples*

EMULSIONS OF CARNAUBA and paraffin waxes, containing triethanolamine or sodium oleate as emulsifying agent, have been applied to experimental lots of McIntosh, Jonathan, Delicious, Newtown, Rome Beauty, Wagener, Stayman and Winesap apples. Effects on respiration, keeping quality and susceptibility to scald were noted. Waxing materially lessened shrinkage (moisture loss) at room temperature when humidity was low, but at high humidities there was little difference in shrinkage of waxed and unwaxed fruit. In fact, atmospheric humidity had more influence in regulating moisture loss than did waxing. The average effect of waxing on respiration intensity was a decrease of about 14 percent. The wax coating retarded the onset of mealiness in Delicious, reduced coreflush in McIntosh and helped to prevent Jonathan spot on Jonathan apples. Flavor was not appreciably altered by waxing in any of the trial lots. The salable period of McIntosh and Delicious after removal from cold storage was prolonged by waxing. In some seasons this improvement in keeping quality was quite pronounced, in other seasons it was much smaller. The wax used in these tests caused a form of scald on McIntosh and Delicious apples. It is possible that this type of scald can be controlled by oiled wraps.

Digest from "Apple Waxing Experiments," by D. V. Fisher and J. E. Britton, *Scientific Agriculture* 21, 70, 1940 (Published in Canada).

# *NOW!*... A More Economical Source of Riboflavin (Vitamin G)

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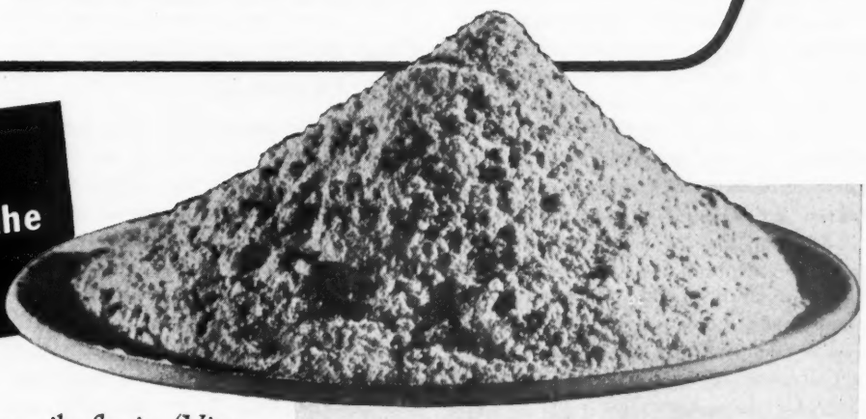

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## BAKING AND MILLING

### *How Milling Conditions Affect Diastatic Activity*

To ascertain the influence of different milling conditions on diastatic activity of flour, test runs were made on a laboratory mill with roll pressures from 250 to 900 kg. per meter of roll length, roll temperatures from 6 to 78 deg. C., at three differentials and with three different roll surfaces.

In the absence of differential, the milling operation gave no significant increase in diastatic activity regardless of the roll pressure and the nature of the roll surface. On polished rolls, diastatic activity was not increased regardless of the roll pressure or the differential. When the mill was operated at a medium or high differential there was an increase in diastatic activity, and the more so the rougher the roll surface and the higher the roll pressure.

The temperature effect on diastatic activity was relatively greater below 20 deg. C. than above 20 deg. C. The increase in maltose figure was approximately a linear function in the roll-temperature range from 30 to 80 deg. C. The smoother the reduction rolls the more heat they develop in milling, even when they do not touch each other. Milling has a distinctly noticeable effect on diastatic activity although the product was in contact with the rolls for only about 0.01 second. The higher maltose figure of commercially milled flours as compared with flours from an experimental mill doubtless result, at least in part, from higher roll temperatures in commercial mills.

Digest from "Effect on Diastatic Activity of Surface, Pressure, Differential and Temperature of the Reduction Rolls in Milling," by Edwin Ziegler, *Cereal Chemistry* 17, 668, 1940.

### *What Baking and Toasting Do to Vitamin $B_1$*

The fermentation test is considered to be at least as accurate as feeding tests for determining the baking loss of vitamin $B_1$ (thiamin) in bread making. An advantage of the fermentation test is that it permits comparing different parts of the slice, thus facilitating the study of losses incurred in baking. Utilizing this advantage, comparative tests have been made in the caramelized crust, the first half-inch under the crust and the center of the slice (one square inch). All results were calculated on the dry basis.

Assuming that thiamin destruction did not extend at all to the center of the loaf, baking loss was taken as the average difference between thiamin content at the center and the thiamin content of the whole slice. On this basis the loss was 8 percent in regular white bread, 5 percent in high-thiamin white bread and 9 percent in whole wheat bread.

Thiamin losses incurred by toasting were also investigated. Lightly toasted regular white and whole wheat breads showed no loss. Heavily toasted regular white bread still showed no loss, but the loss was 12 percent in whole wheat bread. High-thiamin white bread underwent from 4 to 24 percent loss in light, medium and heavy toasting. Melba toast showed 9 percent loss in regular white and 26 percent loss in high-thiamin white bread.

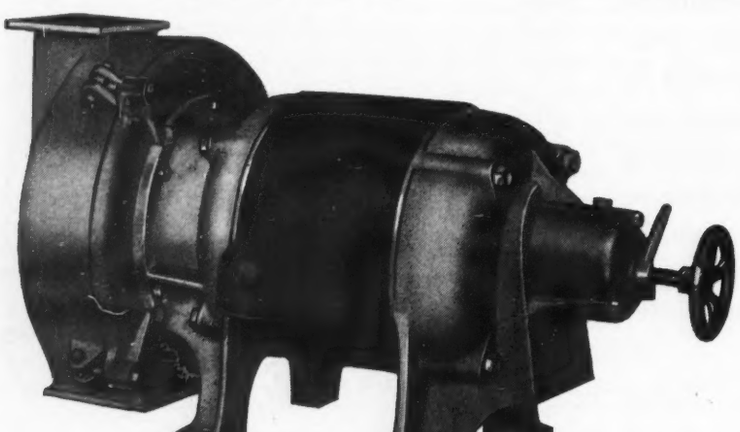
Digest from "Loss of Thiamin in Bread on Baking and Toasting," by Chas. Hoffman, T. R. Schweitzer and Gaston Dalby, *Cereal Chemistry* 17, 737, 1940.

## DAIRY PRODUCTS

### *Irradiated Flavor in Milk*

Excessive exposure of milk, either to sunlight or to ultraviolet rays, gives rise to an objectionable burnt, irradiated flavor. This is known to originate in the milk proteins. To determine the cause of this, two methods were employed. Firstly, excessive irradiation was tried out on milk, cream and skimmed milk, also on the individual proteins partially broken down by acids or enzymes, as well as on the pure amino-acids which are constituents of the proteins. No difference was found in the distribution of the nitrogen in these materials before and after irradiation. With riboflavin (vitamin $B_2$ or G) and other dialyzable matter in milk, irradiation produced an off-flavor, but this differed from the burnt flavor. Some of the amino-acids (especially cystine, methionine, tryptophane and histidine) did acquire a flavor akin to that sought.

Secondly, over-irradiated milk (or casein precipitated by locust bean gum and suspended in water) was steam distilled. The flavoring materials in the distillate were absorbed on charcoal, the charcoal extracted with ether and the ether solution concentrated. Thus a very concentrated solution of the burnt flavor was produced, but not in sufficient amount for chemical analysis. The steam distillate was definitely higher in sulfhydryls than similar solutions from non-irradiated milk. There seems no question but that it is sulphur-containing compounds which produce the flavor. (Evap-

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orated milk canners and milk dealers marketing homogenized milk should note that homogenization before irradiation increases the burnt flavor—The Editors.)

Digest from (1) "Studies on the Source-origin of Activated Flavor in Milk," (2) "Isolation of Substances responsible for the Activated Flavor in Milk," by J. C. Flake, H. C. Jackson and K. G. Weckel, *Journal of Dairy Science* 23, 1079 and 1087, 1940.

### *Frozen Condensed Skim Milk*

SKIM MILK, condensed in the flush season and stored frozen, is successfully used in ice cream manufacture. Sometimes there is trouble with protein precipitation on long storage, which can be overcome by reprocessing. Three types of product have been compared, plain and superheated skim condensed (both 30 percent solids), and sweetened skim condensed (30 percent milk solids, 30 percent sugar). These were frozen and held at about 0 deg. F. for three months. Ice cream batches of the same composition were made from them monthly. The superheated variety shows some protein precipitation on storage. There is no appreciable difference between them in titrable acidity or pH, or in the flavor, body, texture or viscosity of the ice cream made from them. Mixes made from plain condensed whip a little faster, but those with sweetened condensed give the greatest overrun. Stored frozen superheated condensed tends to give a curdy ice cream.

Digest from "A Study of Fresh, and Frozen Plain, Superheated and Sweetened Condensed Skimmilk for Ice Cream," by L. K. Crowe and Harry H. Winn, *Journal of Dairy Science* 23, 1187, 1940.

## MEATS & FISH

### *Calcium Chloride Improves Canned Shrimp*

PROGRESSIVE SOFTENING of canned wet pack shrimp sometimes seriously impairs quality and salability. A systematic search has therefore been made for ways to lengthen shelf life by increasing durability in storage. Based on the known fact that salts of magnesium and calcium improve firmness of canned fish, and on the observation that impure brines are apparently beneficial to canned shrimp, a common impurity of brines was tried experimentally. This was calcium chloride, which gave the best results of the entire investigation. When added to the canning liquor it causes turbidity, but in the blanching brine it has not yet proved as effective as in the presoaking brine despite the fact that its use in the blanch is more convenient than in the presoak. Pending further investigation, calcium chloride in the presoaking brine is the preferred solution of the problem.

Whereas 10 to 14 months has been considered the maximum safe storage time for wet pack shrimp, at ordinary storage temperature, a test by the new method showed good retention of color and firmness after two years at room temperatures in New Orleans. In this test, picked meats were presoaked 35 minutes in cold 90 deg. (salometer) salt brine containing 3 percent (first lot) or 1 percent (second lot) of calcium chloride. They were blanched 9 minutes in boiling 70 deg. (sal.) salt brine, fan dried, graded and packed in No. 1 cans with hot water and one 40-grain salt tablet in each can. Final processing was 10 minutes at 250 deg. F. Calcium chloride was retained in the meats (probably as a calcium:protein complex) and not in the liquor. The anhydrous calcium chloride content of untreated shrimp was 800 parts per million. Shrimp from 1 percent calcium chloride brine contained 1,550 p.p.m., and from 3 percent calcium chloride brine, 2,460 p.p.m. of anhydrous calcium chloride. It has been found that benefit to color and firmness is in direct proportion to the amount of calcium chloride retained by the shrimp meats. The Food and Drug Administration permits use of calcium chloride for this purpose, under stipulations which should be ascertained by interested canners.

Digest from "Effect of Calcium Salts on Firmness and Color of Canned Shrimp," by C. H. Bloedorn, read before the Canning Problems Conference, Chicago, Ill., Jan. 22, 1941, and released by National Canners Association.

### *Processing Studies In Meat Canning*

PROGRESS in 1940 in processing studies of canned meats by the Technical Committee, Meat Section, National Canners Association, has been partly along the line of determining heat resistance under a closer approach to natural conditions than can be had by diluting the substrate. In the new test, the finely ground meat is thoroughly mixed with test spores in a minimum volume of liquid, warmed to melt the fat and quickly distributed among the heat-resistance tubes with the aid of an Alemite gun. Thus there is little or no change in the proportions of constituents. This test, applied to high-salt and low-salt lots of quick-cured lunch tongue packed in gelatine, showed an apparently lower resistance in the high (4.93 percent) salt lot than in the low (3.35 percent) salt lot. But the seeming difference in heat resistance disappears when the heated


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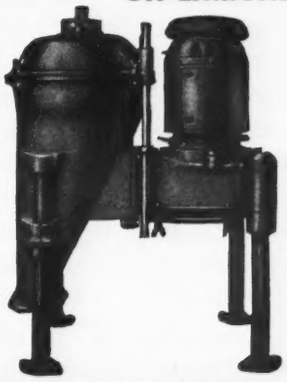

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material is diluted by subculturing into a favorable medium.

Heat-resistance tests of potted meat with cereal apparently revealed a close relation to pH, with the highest heat resistance accompanying the lowest acidity. Since there was no significant difference between tubes incubated with and without subculturing, there is evidently no inhibitor of bacterial growth in this product. In general, the heat resistance of corned beef hash showed a parallel relation to pH, but the relation was not so close in tripe canned with milk.

Digest from "1940 Processing Studies," by J. Yesair and O. B. Williams, read before the Meat Section, National Canners Association, Chicago, Ill., Jan. 23, 1941.

## FRUITS

### *Fats in Sweet Orange Pulp*

DRIED PULP of the California Valencia orange was ground and extracted with petroleum ether. The extract, after evaporating the solvent, was saponified and the unsaponifiable fraction was examined separately. The principal saturated fatty acids were palmitic, stearic and "cerotic" acids, the last apparently being a mixture of two acids higher in the series than either palmitic or stearic acid. The principal unsaturated fatty acids were oleic, linoleic and linolenic acids. A peculiar feature of the fat from sweet orange pulp is that it seemingly does not contain enough glycerol to esterify all the fatty acids in the fat. Probably part of the fatty acids are present as sterol esters, since sitosterol was found by analysis. A phytosterolin and a hydrocarbon (apparently pentacosane) were found in the unsaponifiable fraction.

Digest from "Fatty Constitutents of California Valencia Orange Pulp," by M. B. Matlack, *Journal of Organic Chemistry* 5, 504, 1940.

## SUGAR

### *Crystallizing Sugar*

THE INFLUENCE of viscosity on crystallization is fundamentally different in sugar sirups and salt solutions, not merely because of supersaturation in sugar solutions but more because sucrose forms complex compounds with potassium salts. While these complexes are so unstable that they have not been isolated there is sound evidence of their existence. The practical effect on sugar crystallization is that a substantial proportion of the sugar in solution cannot be recovered as crystalline sucrose.

Experience shows that crystallization

in beet sirups cannot be carried to a purity index lower than 55 parts of sucrose per 100 parts of dry matter in the final molasses, and in practice no better figure than 58 to 60 is ordinarily attained. It is true that 80 to 90 percent of the sucrose can be recovered from molasses in crystalline form by stirring with glacial acetic acid and a solvent such as benzene or ethyl acetate, but the crystals are so small and difficult to refine and the process causes so much inversion that the method has no commercial utility. Molasses formation, with its irreducible minimum of uncrystallizable sugar, must therefore be accepted as a part of sugar refining. But a distinction must be made between true molasses and supersaturated sirups since the latter can be made to crystallize by diluting, reevaporating and adding seed crystals.

Digest from "Practical Crystallization of Sugar," by H. Claasen, *Chemische Fabrik* **13**, 301, 1940 (Published in Germany).

## MISCELLANEOUS

### *Fungous Diseases Injure Food Value of Corn*

DIPLODIA EAR ROT and Fusarium ear rot are two fungous diseases which definitely impair the nutritive value of corn. Another common mold on corn is *Gibberella zeae*. From feeding tests with rats it appears that corn infected by these molds undergoes definite losses in digestibility of nitrogen compounds and in energy value, as well as nutritive value, of the nitrogen sources (proteins). Chemical composition of the grain is changed, especially in destruction of ether-extractable components. Aside from its loss in food value, moldy corn may be distinctly toxic. For example, a sample having 53 percent of its grains damaged by Gibberella mold was highly toxic to young rats. Part of the loss in nutritive value of corn proteins may be attributed to formation of mold proteins, which are biologically inferior. Corn germ seems to be the most sensitive part of the grain to mold attack and for this reason there is a considerable loss of fat in mold-damaged corn, averaging about 25 percent. *Fusarium* molds do relatively more damage to digestibility and protein nutritive value than do the diplodia molds.

Digest from "Impairment in Nutritive Value of Corn Grain Damaged by Specific Fungi," by H. H. Mitchell and Jessie R. Beadles, *Journal of Agricultural Research* **61**, 135, 1940.

### *Decaffeinized Coffee*

REFRESHING QUALITY OF COFFEE does not depend on its caffeine content, according to comparative tests with untreated and decaffeinized coffee. The refreshing effect of a beverage depends in part on the rate of absorption from the stomach and intestine. Tests of eight liquids for rate of absorption showed the following order from fastest to slowest: Tea, coffee, sugar solution, fruit drinks such as lemonade, hot beef tea, skim milk, whole milk, cream. But rate of absorption is only one factor in the refreshing quality of beverages. In coffee, while no difference of any significance was observed between untreated and decaffeinized coffees, the content of aromatic principles makes a great deal of difference. Temperature is also important, in that the aromatic principles must be extracted with boiling water and lose their best effect when the beverage is cold. This is in contrast with fruit drinks, which are more effective cold than hot. Since the aromatic content of coffee gives its best effect only while still hot after being freshly extracted, freshness in coffee is a leading factor in refreshing quality. Physiologically, decaffeinized coffee is superior to cold drinks in its rapidity of refreshing effect.

Digest from "Observations on the Effect of Decaffeinized Coffee and the Importance of Aromatics, with Remarks on Refreshing Effect," by W. Kretschmer, *Schweizer medizinische Wochenschrift* **70**, 1110, 1940 (Published in Switzerland).

### *Vitamin B-Complex Produced Biologically*

PRODUCTION OF VITAMINS of the B-complex, particularly $B_2$ or riboflavin, by various types of bacteria is the discovery disclosed in U.S. Patent No. 2,202,161 granted to Carl S. Miner, Glencoe, Ill., and assigned to Commercial Solvents Corp., Terre Haute, Ind.

The organisms are identified as butyl alcohol producers when grown in a molasses, a grain-and-molasses or a grain-and-dextrose mash containing nutrient and buffer salts. Vitamin production is particularly aided by the use of ammonia or ammonium salts to control the pH during the fermentation period.

Depending upon the specific organism and the fermentable mash used, the fermentation period at 30 deg. C. is 40, 42, 44, 60, 64 or 70 hours in length with an increase of 200 to 500 percent in vitamin B-complex content of the mash.

Recovery of the vitamins may be by concentrating and drying the residual solids or by extraction or adsorption procedures. Concentrates are obtained either by settling and decanting or by evaporation in a multiple effect unit under a vacuum of 27 to 28 in. at 70 deg. C. to a 35 percent solids basis. Upon drying in rotary drums, vacuum or

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spray driers at 50 deg. C., the concentrates are brought to a 10 to 13 percent moisture content. Extraction or adsorption is used to obtain the vitamins in crystalline form and purity.

### *Vitamin Concentration*

PANTOTHENIC ACID, one of the members of the vitamin-B complex, has been found in tuna liver. About 4 metric tons of tuna livers were used in isolating and identifying the vitamin. An extract from the livers, after being freed from oil, was evaporated in vacuum until the organic dry matter content was about 16 to 20 percent. The activity of this crude preparation as a growth factor was 15,000, in units based on a bacterial cell growth test.

Activity was raised to 23,000 by precipitating inert components, then to 50,000 by treatment with a solvent and to 65,000 by precipitation with phosphotungstic acid. Further purification and repetition of the phosphotungstic acid precipitation brought the activity up to 270,000. The chromatographic method, which has given excellent results with other vitamins, was then employed as a final step in refining the tuna liver vitamin.

Preparations ranging in activity from 1,500,000 to 3,000,000 were obtained in this way. In spite of the complexity of these purification operations nearly half of the vitamin originally present in the liver extract was recovered in these highly active preparations. The most effective adsorbent for use in the final (chromatographic) purification is alumina which has been treated with dilute hydrochloric acid.

Digest from "Dihydroxyacyl Derivatives of beta-Alanine and levo-Leucine From Tuna Livers," by Richard Kuhn and Theodor Wieland, *Berichte der deutschen chemischen Gesellschaft* **73**, 962, 1940 (Published in Germany).

### *Beer Foam and Egg Foam*

DYNAMIC METHODS of foam measurement have been developed in connection with ore flotation, but static methods are still useful and significant in brewing, baking and other industrial processes. A fundamental difference is that dynamic foam meters measure the foam in the process of formation, while static measurements are made after the foam is produced. For purposes of comparison, egg white foams and beer foams, produced with air in some tests and with carbon dioxide in others, have been measured by both methods.

Egg white air foam gives relatively small volume and large bubbles, with no surface coagulation and no deposition of scum when the foam subsides. Egg white carbon dioxide foam gives much greater volume with smaller bubbles and leaves a scum of coagulated protein when the foam subsides. The carbon dioxide foam drains more rapidly than the air foam, and there is evidence that the drainage liquid originates from collapse of bubbles, not from thinning of bubble walls. Dynamic measurements indicate longer foam life than do static measurements in egg white foams. By the dynamic method the carbon dioxide foam has a longer life than the air foam, while the static method indicates longer life for the air foam.

Where the rate of subsidence in egg white foams does not follow a logarithmic function, the subsidence rate of beer foams is logarithmic for half the life of air foams, and for nine-tenths of the life of carbon dioxide foams. Drainage from finely dispersed (small-bubble) foams is faster than from coarse, large-bubble foams. There is good evidence of a reaction between carbon dioxide and protein in protein foams. One result is the scum remaining when the foam subsides. Another difference between carbon dioxide and air foams is that the liquid absorbs a noticeable quantity of carbon dioxide, but not of air.

Digest from "Measurement of Static and Dynamic Foams in Characteristic Units," by G. L. Clark and Sydney Ross, *Industrial and Engineering Chemistry* **32**, 1594, 1940.

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## Rendering of Lard

*(Continued from page 49)*

stability of the lard but imparted a slightly dark color and a slight odor and flavor of caramel to the lard. Bleached sugar-rendered lard was white, it was less stable than the unbleached sugar-rendered lard, and it was more stable than untreated lard.

Both the bleached and unbleached sugar-rendered lards were used to make cakes and pie crusts of satisfactory quality.

## Wetting Agents

*(Continued from page 52)*

### *Effect of Concentration Of Acid and Lye*

Solutions of both hydrochloric acid and sodium hydroxide were prepared, these ranging in concentration from 2 percent to 18 percent. The solutions were then heated to temperatures varying from 100 deg. F. to 140 deg. F. Peaches of the three varieties were then immersed in these hot solutions and later removed after various lengths of time to determine their ease of peeling. The peeling was carried out with the aid of rubber gloves by holding the peach under cold water and rubbing. Later, varying amounts of the three wetting-out agents were added and the procedure repeated. Fig. 1 shows the time required to peel Georgia Belle peaches in both acid and lye baths at different concentrations, each containing 0.5 percent of "MP 189" as a wetting-out agent and kept at a temperature of 140 deg. F.

### *Effect of Temperature*

As was to be expected, an increase in the temperature of the peeling baths resulted in a decrease of the time required to peel the peaches. This was even more pronounced in the case of the lye bath than with the acid solution. It was not deemed advisable to attempt to peel the peaches at any temperature above 140 deg. F., since Woodroof[3] reports that at higher temperatures the tissues are cooked. Fig. 2 shows the time required to peel J. H. Hale peaches in a 10 percent hydrochloric acid solution and in a 10 percent sodium hydroxide solution, each containing 0.5 percent "Santomerse" as a wetting-out agent.

### *Effect of Concentration Of Wetting Agent*

Fig. 3 shows the time necessary to peel Elberta peaches in a 10 percent hydrochloric acid solution and in a 10 percent sodium hydroxide solution, each containing varying amounts of "Nacconol NR" as a wetting-out agent, and each maintained at a temperature of 140 deg. F. As noted on the graph, the sharpest decline in the time required for peeling takes place up to a concentration of 0.5 percent. Thereafter, the curve tends to straighten out and become parallel with the coordinate axis. Addition of the wetting-out agent above a concentration of 1.0 percent resulted in the formation of a precipitate, probably showing the limit of solubility of the agent at these conditions.

### *Summary*

The addition of small amounts of a wetting agent to both acid and lye solutions greatly reduces the time necessary for peeling peaches—this reduction sometimes amounting to as much as 65 percent.

The time necessary for the peeling of peaches decreases as the concentration of both the acid and lye baths increase—the optimum concentration being about 10 percent in each case.

The time necessary for the peeling of peaches decreases as the temperature increases—the optimum temperature being 140 deg. F. in each case.

The time necessary for the peeling of peaches decreases as the concentration of the wetting agent increases, up to a concentration of about 1.5 percent, above which no increase was noted—the optimum concentration being from 0.5 to 0.8 percent.

All the varieties studied, Elberta, J. H. Hale and Georgia Belle, responded alike to all the tests. Any dissimilarities in their behavior in the peeling baths were due to the differences in the degree of ripeness and not to any varietal differences.

Everything else being equal, the time required for peeling peaches in the lye bath was about half that required in the acid bath.

All three of the wetting agents used seemed to be quite similar in behavior—no one seeming to have any advantage over the others.

Storage-ripened and tree-ripened peaches were both easily and completely peeled in the acid and lye baths containing a wetting-out agent, provided that the fruit was evenly and thoroughly ripened.

The effect of the different peeling solutions on the color and taste of the peach while in cold storage is now being observed.

#### References

1. R. B. Taylor, U. S. Patent 2,097,479 (1937).
2. D. K. Tressler and C. F. Evers, "The Freezing Preservation of Fruits, Fruit Juices, and Vegetables," Avi Publishing Co., New York (1936).
3. J. G. Woodroof, Preserving Fruits by Freezing. I—Peaches, *Bulletin* Georgia Experiment Station, No. 163 (1930).

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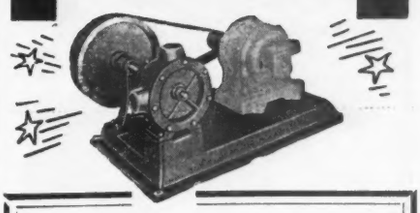

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# Books

## Facts About Enrichment

ENRICHED FLOUR. By Clara Gebhard Snyder. Published by Wheat Flour Institute, 309 W. Jackson Blvd., Chicago, Ill. 1941. 11 pages; 4x9 in.; paper. Free.

This little pocket pamphlet tells what enriched flour is and why it is important. The facts are conveniently presented as answers to questions which the rush to enrich flour and bread have brought to the minds of those in the food industries.

VITAMINS, MINERALS AND FLOUR. Published by Chemical Co., Inc., 170 Varick St., New York, N. Y. 1941. 27 pages; 4x6 in.; paper. Free.

Important testimony at Federal hearings on standards of identity of enriched flour has been compiled in a convenient, quick-reference form in this miniature booklet. It tells what the experts had to say about dietary deficiencies, proposed additional ingredients, levels for proposed ingredients, determination of quantities in the finished product, the chemical relationship of various ingredients, effects of processing and cooking, effects of vitamin $B_1$ enrichment, synthetic vs. natural ingredients, and labeling.

## Action of Ultraviolet

THE CHEMICAL ACTION OF ULTRAVIOLET RAYS. By Carleton Ellis and Alfred A. Wells. Revised and enlarged by Francis F. Heyroth. Published by Reinhold Publishing Corp., 330 West 42nd St., New York, N. Y. 1941. 891 pages; 6¼x9¼ in., cloth. Price, $12.

New knowledge about photochemistry and new practical applications of the science have led the publishers to revise and considerably enlarge the original work of Ellis and Wells. And the new edition contains much of interest to food technologists. Among the chapters having a particular bearing on foods are these: The Reactions of Fatty Acids and the Preservation of Foods; Photochemical Behavior of Compounds of Biological Significance; The Lethal Action of Ultraviolet Rays and Sterilization; The Photochemistry of the Formation of Vitamin D; Commercial Production of Vitamin D; Ultraviolet Light and Other Vitamins; Photosensitized Biological Processes; Photosynthesis of Carbohydrates; and Effects of Ultraviolet Radiations on Plants.

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Students of photochemistry will find in this book an exhaustive treatise on the subject, even to extensive references to literature.

## For Financial Executives

THE BALANCE SHEET OF THE FUTURE. By Roy A. Foulke. Published by Dun & Bradstreet, Inc., 290 Broadway, New York, N. Y. 1941. 99 pages; 7x10 in.; paper. Free.

A general program of basic change and refinement in accountancy practice is favored by four groups of business specialists: The banker, the financial executive, the credit man and the accountant. This was discovered by a questionnaire sent to 6,000 specialists, the questionnaire and summaries of the answers being reported in this booglet.

Also included in the work is a table of 14 important financial ratios for 72 lines of business activity. Among these are ratios for confectionery manufacturers, fruit and vegetable canners, for wholesalers of butter, eggs and cheese, coffee and tea, imported foods, fresh fruits and produce, groceries, meat and poultry, wines and liquors, and for retail chain grocery stores. It will be enlightening, and perhaps in some cases frightening, for food companies to compare their financial ratios with those given in the table.

## All About Truck Operations

MOTOR TRUCK RED BOOK. 1940 Edition. Published by Traffic Publishing Co., Inc., 100 Sixth Ave., New York, N. Y. 925 pages; 8½x11 in.; cloth. Price, $10.

Now in its fourth edition, this motor truck reference book has been completely revised and enlarged so that it covers practically all phases of truck operation. The information given is to the point, practical and from reliable sources.

There is not space here to list all the subjects treated in this "handbook," but some of the more important to food fleet operators are: Selection of motor trucks, performance ability of trucks, economic life of trucks, operation, insurance, taxation, costs, accounting, dimension and weight regulations, other regulations, private carriers, qualifications of drivers and routing. A number of operating and accounting forms, collected from trucking companies, are shown in the Appendix.

# Patents

**Whole Milk Separated Into Cream and Skimmed Milk for Separate Purification Treatment Followed by Remixing Into Whole Milk**—Hans Olof Lindgren, Appelviken, Sweden, to De Laval Separator Co., New York, N. Y. No. 2,227,837. Jan. 7, 1941.

**Sausages Linked Into Predetermined Lengths by Mechanical Means**—Daniel Douglas Demarest, Little Neck, N. Y., and Carl Berendt, East Orange, and William Karius, Irvington, N. J., to Automatic Linker, Inc., Newark, N. J. No. 2,228,075. Jan. 7, 1941.

**Casein Precipitated by Atomizing Skimmed Milk Into Hydrochloric Acid Gas Atmosphere**—Elmer B. Oberg, Evanston, Ill., to United States Gypsum Co., Chicago, Ill. No. 2,228,151. Jan. 7, 1941.

**Fresh Whole Fruit Protected Against Decay by Washing and Treating With Solution Containing Oil Soluble Fungicide**—Jagan N. Sharma, Los Angeles, Calif., and Harry M. Pancoast, Riverside, Calif., to Food Machinery Corp., San Jose, Calif. No. 2,228,410. Jan. 14, 1941.

**Raw Lean Meat Tenderized by Cross Slitting on Top and Bottom of Mass**—Joseph P. Spang, Quincy, Mass., to Cube Steak Machine Co., Inc., Boston, Mass. No. 2,228,414. Jan. 14, 1941.

**Heated Plastic Cheese Cooled and Hardened During Extrusion Through Orifice Preliminary to Cutting Into Sections and Wrapping**—Ashur U. Wetherbee, Evanston, Ill., to Kraft Cheese Co., Chicago, Ill. No. 2,228,492. Jan. 14, 1941.

**Pies Sealed by Mechanical Crimping of Rims**—Lloyd J. Harris, Kenilworth and Bernard Lambers, Oak Park, Ill., to Lloyd J. Harris. No. 2,228,516. Jan. 14, 1941.

**Candy Deposited by Plurality of Concurrently Operating Pumps Equipped With Water-lubricated Pistons to Prevent Sticking**—Albert Victor Newman, Cambridge, Mass., to Edgar P. Lewis & Sons, Inc., Malden, Mass. No. 2,228,531. Jan. 14, 1941.

**Corn Steeped in Sodium Bisulphite and Ammonia Bisulphite Solution Containing Mono-Chlor-Benzene and Ortho-Chlor-Toluene to Produce Starch With High Paste Viscosity**—Carl Bergquist, Stockholm, Sweden, to Corn Products Refining Co., New York, N. Y. No. 2,228,717. Jan. 14, 1941.

**Bakery Dough Sponge Made to Incorporate Boiling Butter as Step in Producing Health Bread**—Andrew E. Péan, Chicago, Ill. No. 2,228,729. Jan. 14, 1941.

**Foods Frozen While Passing Through Upright Closed Casing Fitted With Series of Stationary Circular Refrigerated Shelves Provided With Means of Moving Food in Circular Path and Spreading Over Surface of Shelves in Shallow Layers**—Clarence Birdseye, Gloucester, Mass., to Mechanical Research Inc., Providence, R. I. Nos. 2,228,998; 2,228,999, and 2,229,000. Jan. 14, 1941.

**Doughnuts Fried in Dual Depositing Machine Equipped to Keep Oil Automatically at Constant Level**—Charles E. Carpenter, Chicago, Ill. No. 2,229,167. Jan. 21, 1941.

**Fruit Diced by Forcing Vertical Knives Into Top and Bottom of Fruit, Circular Knives Into Fruit Through Lateral Plane Followed by Rotation of Fruit and Removal of Top and Bottom Cut Pieces and Vertical Coring and Dicing Knives for Removal of Core**—Ellsworth W. Carroll, Charles Lachman and Paul Wormser to S & W Fine Foods, Inc., San Francisco, Calif. No. 2,229,168. Jan. 21, 1941.

**Dry Food Materials Sterilized by Subjection to High Vacuum, Treatment With Ethylene Oxide in Ratio of about 6 lb. Per 100 Cu. Ft. of Space, and Holding For Approximately 6 Hours**—John M. Baer, Chicago, Ill., to Guardite Corp. No. 2,229,360. Jan. 21, 1941.

**Can for Preservation of Foods-and Beverages Made to Have Body of Ferrous Metal Lined With Rubber Chloride Baked Onto Metal Body in Presence of Hardening Agent**—James Wallace Raynolds, Pittsburgh, Pa., to Raolin Corp., New York, N. Y. No. 2,229,602. Jan. 21, 1941.

**Vegetables to be Canned Blanched in Continuous Manner by Passage Through Conduit Containing Heated Liquid and Having Length Varying to Give Desired Blanching Time Period**—Winford E. Nicholoy, to Scott-Viner Co., Columbus, Ohio. Nos. 2,229,609 and 2,229,610. Jan. 21, 1941.

**Vitamin B Extract Prepared From Cereals to Form Concentrate**—George C. Supplee, George E. Flanigan and Raymond C. Bender, Bainbridge, N. Y., to Borden Co., New York, N. Y. No. 2,229,684. Jan. 28, 1941.

**Bacon Sides Given Rectangular Shape by Mechanical Pressure**—Louis J. Menges, to Lou Menges and Associates, St. Louis, Mo. No. 2,229,862. Jan. 28, 1941.

**Zein Derived From Corn Gluten Treated to Remove Oil and Color Impurities**—Leslie O. G. Pearce, Whiting, Ind., to Prolamine Products, Inc., Dover, Del. No. 2,229,870. Jan. 28, 1941.

**Wort Cooled by Causing to Flow in Thin Flat Stream Into Chamber With Current of Air Until Predetermined Volume is Obtained, Wort Flow is Cut Off, and Contents of Chamber are Recirculated With Precipitation of Nitrogenous Substances and Hop Resins Until Predetermined Temperature is Obtained**—Robert Schwartz, White Plains, and Fred L. A. Schmidt, Hollis, N. Y., to Schwarz Labs., Inc., New York, N. Y. No. 2,229,875. Jan. 28, 1941.

**Pineapples Topped in Mechanical Manner During Movement on Endless Conveyor Past Cutting Station With Controlled Pressure on Fruit**—Conrad H. Matthiessen, Jr., Pasadena, Calif., to Hawaiian Pineapple Co., Ltd., Honolulu, Hawaii. No. 2,229,896. Jan. 28, 1941.

**Roasted and Ground Coffee Bean Percolated by Aerated Water Held Near Boiling Point to Prepare Brew**—George A. Fisher, Indianapolis, Ind., to William S. Scull Co., Camden, N. J. No. 2,230,031. Jan. 28, 1941.

**Meat-loaf Mixtures Cured At Below 30 Deg. F., Run Into Cans and Sterilized by Heat Treating Under Greater Than Atmospheric Pressure**—Isaac N. Jordan, Chicago, Ill. No. 2,230,062. Jan. 28, 1941.

**Chocolate Paste Passed From Mixing Device Through Series of Rolls Operating Counter to Each Other Without Any Grinding Action and Returned to Mixing Device While Being Given Conching Treatment**—Henry Skanes, Copenhagen, Denmark. No. 2,230,166. Jan. 28, 1941.

**Fruit Juices and Other Liquids Saturated With Gas During Passage Through Centrifuge**—Otto Brecour, Wandsbek, and Friedrich Kranz, Bergedorf-Lohbrugge, Hamburg, Germany, to De Laval Separator Co., New York, N. Y. No. 2,230,210. Jan. 28, 1941.

**Flour Made From Endosperm Portions of Wheat Grains Ground With Oil-extracted Wheat Germs to Have Natural Germ Solids-not-fat Content**—Frank G. Wellinghoff, St. Louis, Mo. No. 2,230,417. Feb. 4, 1941.

**Peanuts Treated to Extract Soluble Proteins**—Andrew McLean, Saltcoats, Scotland, to Imperial Chemical Industries, Ltd. No. 2,230,624. Feb. 4, 1941.

**Cereal Grits Sprayed With Concentrated Salt Solution During Agitation and Then Dried and Made as Free From Surface Salt as Before Spraying**—Hugh E. Allen, one-half to Albert G. McCaleb, Evanston, Ill. No. 2,230,672. Feb. 4, 1941.

**Nuts Cracked by Mechanical Means**—Arthur Francis Anderson to Hawaiian Macadamia Nut Co., Ltd., Honolulu, Hawaii. No. 2,230,790. Feb. 4, 1941.

**Vegetable Oils Treated With Fine Stream of Alkali Under Pressure in Zone of Rapid Rotation Travel in Course of Continuous Refining Precedure**—Olof Einar Froding, Stockholm, Sweden, to De Laval Separator Co., New York, N. Y. No. 2,230,796. Feb. 4, 1941.

**Potato Slices Mechanically Submerged in Cooking Fat for Controlled Conversion Into Chips**—Joseph D. Ferry, Harrisburg, Pa.; Sylvia O. Ferry, executrix. No. 2,231,114. Feb. 11, 1941.

**Gum Drop Confections Made From Thin Boiling, High Fluidity Starch**—Harry Meisel, North Bergen, N. J., to Corn Products Refining Co., New York, N. Y. No. 2,231,476. Feb. 11, 1941.

**Reducing Sugar Content of Starch Conversion Mixture Regulated to Give Dry, Water-soluble, Nonhygroscopic Product**—James F. Walsh, Tuckahoe, N. Y., and Abraham H. Goodman, Hammond, Ind., to American Maize-Products Co. No. 2,231,835. Feb. 11, 1941.

**Citrus Fruit Colored by Dye Soluble in Oils and Waxes of Peel**—Jagan N. Sharma, Los Angeles, Calif., to Food Machinery Corp., San Jose, Calif. Reissue No. 21,720. Feb. 18, 1941.

**Fully Drawn Chicken Frozen by Passage of Brine Through Tube Extending Lengthwise Through Fowl Whose Abdominal Cavity is Filled With Giblets and Water**—John N. Crider, Astoria, Long Island, N. Y. No. 2,231,886. Feb. 18, 1941.

**Albumin-like Product Made From Oil-free Soya Flour**—Earl H. Cummins, to Curtiss Candy Co., Chicago, Ill. No. 2,232,052. Feb. 18, 1941.

**Pit-containing Fruit Mechanically Selected, Fed and Positioned for Removal of Pit**—Ellsworth W. Carroll, to S. & W. Fine Foods, Inc., San Francisco, Calif. Nos. 2,232,207; 2,232,208; 2,232,209 and 2,232,210. Feb. 18, 1941.

**Cottage Cheese Whey Adjusted to Less Than ½ Percent Lactic Acid Content and Treated With Small Amount of Sodium Bisulphite Preparatory to Concentrating and Drying**—Charles O. Lavett, to Buffalo Foundry & Machine Co., Buffalo, N. Y. No. 2,232,248. Feb. 18, 1941.

**Hog Carcasses Automatically Given Adhesive Coating for Removal of Hair During Continuous Travel on Horizontal Trolley**—Frank W. Marlow, Sr., University City, Mo. One-half to John F. Krey, St. Louis, Mo. No. 2,232,251. Feb. 18, 1941.

**Fruits and Vegetables Given Surface Treatment of Coloring Substance in Fine State of Division and Polished at Temperatures Above 90 Deg. F.**—Jagan N. Sharma, Los Angeles, Calif., to Food Machinery Corp., San Jose, Calif. No. 2,232,278. Feb. 18, 1941.


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**Dried Beans and Peas Given Surface Heating and Soaking Preparatory to Canning and Subsequent Retorting to Cooked and Sterilized Condition**—Fred Struble, Berkeley, Calif. No. 2,232,282. Feb. 18, 1941.

**Margarine Made to Contain Ester of a Polyhydric Alcohol and a Higher Fatty Acid Having at Least One Free Alcoholic Hydroxyl Group in Polyhydric Alcohol Part of Ester**—Roy C. Newton and Leo C. Brown, to Industrial Patents Corp., Chicago, Ill. No. 2,232,401. Feb. 18, 1941.

**Lactic Acid Made From Calcium Lactate Recovered From Fermented Mashes**—John Müller, Philadelphia, Pa. No. 2,232,554. Feb. 18, 1941.

**Corn Steeped in Water Liquor Having Temperature of Between 120 and 150 Deg. F. With pH of Between 4 and 7 for About 3 to 18 Hours**—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,232,555. Feb. 18, 1941.

**Yeast Suspended in Acetone at Temperature Below 50 Deg. F. as Step in Making Dried Live Yeast With Improved Flavor and Taste**—André Draghi, New York, N. Y. No. 2,233,251. Feb. 25, 1941.

**Bakery Doughs Subjected to Test for Measuring One or More Physical Changes During Application of Baking Heat**—John C. Baker, Montclair, N. J., to Wallace & Tiernan Products, Inc., Belleville, N. J. No. 2,233,372. Feb. 25, 1941.

**Vitamin A Synthesized**—Richard Kuhn, Heidelberg, Germany, and Colin J. O. R. Morris, London, England, to Winthrop Chemical Co., Inc., New York, N. Y. No. 2,233,375. Feb. 25, 1941.

**Vitamin C Recovered From Lemon Juice**—Charles G. King and William A. Waugh, Pittsburgh, Pa. No. 2,233,417. March 4, 1941.

**Soya Protein Extracted from Soya Meal on High-yield Basis**—Eric Wahlforss, Agelzy, Finland, and John A. Satosky, deceased, to the Glidden Co., Cleveland, Ohio. No. 2,233,439. March 4, 1941.

**Fruit Washed in Metal Salts Solutions for Removal of Spray Residues**—Clarence D. Dolman, Chelan County, Wash., to Hercules Glue Co. No. 2,233,447. March 4, 1941.

**Jelly Made From Powdered Pectin Composition Upon Addition of Water, Heating to Boiling, and Cooling**—George L. Baker and Marvin W. Goodwin, Newark, Del., to the Public of the United States. No. 2,233,574. March 4, 1941.

**Glycerin Purified by Crystallization**—Henry B. Hass, West Lafayette, Ind., to Purdue Research Foundation, Lafayette, Ind. No. 2,233,606. March 4, 1941.

**Eggs Cleaned by Mechanical Means**—Alfred Benjamin Carper, Creswell, Ore. No. 2,233,910. March 4, 1941.

**Sausage Skins Formed, Stuffed With Sausage Meat, Moved Through Cooking Compartment in Parallel Lengths, and Pinched at Predetermined Points to Separate Meat Into Segments Without Cutting the Skins**—Glen E. Mason, St. Louis County, Mo. No. 2,234,054. March 4, 1941.

**Flour in Bags Compactly Settled by Mechanical Means Following Filling Operations**—Helmer Anderson to General Mills, Inc., Minneapolis, Minn. No. 2,234,069. March 4, 1941.

**Bread Given Twist-loaf Characteristics by Cutting the Panned Dough at Oblique Angles Prior to Proofing**—Carl C. Guldbech, New York, N. Y. No. 2,234,526. March 11, 1941.

**Fresh Meat Carcasses Protected During Shipping by Enclosure in Paper Bag Closed by Stitching and Binding Cord**—Paul Arzet and Gus O. Lorenz, to Kennedy Car Liner & Bag Co., Inc., Shelbyville, Ind. No. 2,234,794. March 11, 1941.

**Fruit Juice Extracted in Machine Equipped With Fruit Holding Cup and Apertured Breast Plate With Reciprocal Fruit Pressing Head**—Bronson C. Skinner and James J. R. Bristow, to Essential Oil Producers, Inc., Dunedin, Fla. No. 2,234,880. March 11, 1941.

**Plastic Shortening Super-cooled and Passed Through Approximately 160 ft. of 2-in. Unrefrigerated Pipe to Develop Texture While Dissipating Heat of Crystallization**—Roy C. Newton and Guy W. Phelps, to Industrial Patents Corp., Chicago, Ill. No. 2,234,931. March 11, 1941.

## Springers in Cans

(*Continued from page* 60)

procedure, process and cooling procedure regularly employed for canning chili were followed. The properly cooled, processed cans were stored at 98 deg. F. and examined periodically for springers. The results obtained are tabulated in Table I.

It will be noted from the table that the mixtures of ingredients containing chili powder and oregano developed hydrogen springers more rapidly than those in which these spices were not present. It appears from the above that chili powder and oregano when canned with meat and beans accelerate the formation of hydrogen springers. The manner in which these spices act to increase the rapidity of hydrogen springer formation is not known at present.

As the materials entering into the chemical reaction causing hydrogen springers cannot be eliminated from canned mince meat, vinegar-pickled meats, chili and tamales, it is advisable to delay the reaction as much as possible so that the food is used before sufficient gas has formed to force out the ends of the cans. The following conditions have been found to delay the formation of hydrogen springers:

1. Storage at low temperatures.
2. Good vacuum.
3. A maximum headspace satisfying the requirements of the regulations covering the fill of the container and acceptable to the consumer.

Experience has shown that a rapid turnover of these products is desirable, as prolonged storage, especially at high temperatures, is likely to result in hydrogen springers.

For some products packed in oblong cans, standards for vacuum based on the paneling of the can have been established. These require that three sides of the can are concave and that one side is flat. When a can does not satisfy these requirements, it is known as a springer. It is common practice to close these cans under mechanical vacuum, and those factors outlined when vacuum is obtained by mechanical means apply to oblong cans as well as to round cans. When ground-meat products are canned in square or oblong cans, the use of mixers operating under a high vacuum has been of great assistance in securing proper paneling of the can by removing gases from the meat so that higher vacuum is obtained in the can.

### *Many Factors Involved*

It will be noted from the foregoing that many factors may be involved in causing springers in canned meats. Although in some instances springers may be caused by a single factor, more frequently they result from combinations of these conditions. The prevention of springers involves a study of the canning procedures to determine which of these contributes the causes, and the elimination of these causes. In general, springers may be minimized by employing methods of canning which insure good vacuum in the can. To secure a good vacuum in a can, it should be well exhausted, filled to give a minimum gross headspace of ¼ in. and handled promptly. The prevention of springers in canned meats does not necessitate the use of special canning procedures, but requires careful adherence to those canning methods commonly accepted as good practice for canning meats.

## Odor in Waste

(*Continued from page* 58)

about 1,500 p.p.m. The cost of sodium nitrate for treating such a waste would be 0.4 cent per case. Since the cost bears a direct relationship to the strength of the waste, good housekeeping methods about the cannery would aid materially in reducing the cost of treatment.

Experiments on the use of sodium nitrate in biological filters treating cannery waste were limited owing to lack of available time. This work was carried out partly by the National Canners Association and partly as the result of suggestions given by us. At one filter treating waste from the packing of corn, tomatoes and lima beans, the addition of sodium nitrate eliminated odor formation. At another high rate filter treating corn waste only the use of 200 lb. of sodium nitrate per day was accompanied by a desirable increase in pH of the filter effluent and change in type of flora on the filter. Reduction in the amount of lime used to control the pH effected a savings sufficient to cover the cost of the sodium nitrate used. At a third filter treating a mixture of corn waste and domestic sewage the addition of 200 lb. of sodium nitrate per day to a flow of approximately 750,000 gal. corrected in a short time abnormal pH and odor conditions. At each of these treatment plants the nitrate treatment was begun after abnormal conditions had developed. It is believed that the use of sodium nitrate at lower dosage rates starting at the time the disposal plant begins to operate would prove to be more effective.

### *References*

[1] A. L. Fales, *Journal of Industrial and Engineering Chemistry*, 21, 216, 1929.
[2] W. T. Carpenter, *Water Works and Sewage* 79, 175, 1932.

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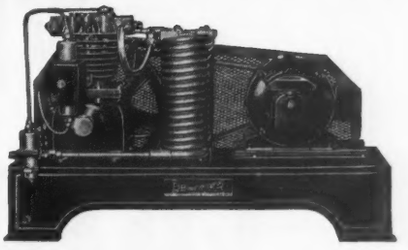

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# Formulas for Foods

FORMULA NO. 179

## Prepared Horseradish

Wash the horseradish roots thoroughly. Remove any spots and blemishes. Remove skins either by hand scraping or by an abrasive type vegetable peeler. Grind the cleaned, skinned roots either by cutting or chopping, or preferably run them through a horseradish grating machine.

Prepare a salted vinegar:

| | |
|---|---|
| Vinegar, 40 grain, distilled | 100 gal. |
| Salt (variable) | 20 lb. |

Cover the grated horseradish with the salted vinegar in a closed container, such as a keg or barrel, to exclude air.

Do not produce in advance of actual shipments when using this formula, nor expect the product to remain merchantable for indefinite periods.

Formula from Labouche Cheval.

FORMULA NO. 180

## Prepared Pancake Flour

| | |
|---|---|
| Wheat, corn and rice flour | 10 lb. |
| Soy flour, full fat | 5 lb. |
| Baking powder | 10 oz. |
| Sugar (sucrose) | 7 oz. |
| Salt | 3½ oz. |
| Dry milk, powder | 1 lb. |

Formula from
A. E. Staley Manufacturing Co.

FORMULA NO. 181

## Catchup

| | |
|---|---|
| Tomato juice (cyclone juice) | 300 gal. |
| Paprika | 6 lb. |
| Onions, peeled and ground | 30 lb. |
| Salt | 39 lb. |
| Cayenne pepper | 4¼ oz. |
| Cassia | 6 lb. |
| Cloves, whole | 3 lb. 15 oz. |
| Mustard, dry, powdered | 6 oz. |
| Sugar (sucrose) | 210 lb. |
| Vinegar, 90 grain, white | 13½ gal. |
| Yield | 162 gal. |

Formula from Labouche Cheval.
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FORMULA NO. 182

## Punch Sirup

***(For Fountain Use)***

| | |
|---|---|
| Strawberry juice | 75 gal. |
| Grape juice | 34 gal. |
| Loganberry juice | 40 gal. |
| Pineapple juice | 60 gal. |
| Cherry juice | 20 gal. |
| Sodium benzoate (in 1 gal. water) | 4 lb. |
| Citric acid (in 10 gal. water) | 54 lb. |
| Water | 50 gal. |
| Grape shade (in 1 gal. water) | 4½ oz. |
| Sugar | 2,760 lb. |
| Yield | 480 gal. |

Mix all ingredients together in the cold.

To make grape shade color, mix in dry powder form:

| | |
|---|---|
| FD&C Red No. 1 | 2 oz. |
| FD&C Red No. 2 | 1 oz. |
| FD&C Blue No. 2 | 1 oz. |
| FD&C Green No. 3 | ¼ oz. |
| FD&C Yellow No. 5 | ¼ oz. |

Dissolve in water. Make up to 1 gal. with water. If the grape shade color is to be stored for any length of time, add ½ oz. benzoate of soda solution per gallon of grape-shade solution to prevent bacterial growth in it. Substitute the water in the benzoate solution for the same amount of water used in dissolving the certified colors.

To make sodium benzoate solution, dissolve 2 lb. 13 oz. in 3 quarts of water.

Formula from David Algie

FORMULA NO. 183

## Chocolate Fudge Icing

| | |
|---|---|
| Butter at 70 deg. F. | 1 lb. 8 oz. |
| Sugar, XXXX (sucrose) | 4 lb. |
| Egg yolk | 1 lb. 4 oz. |
| Vanilla extract | 1 oz. |

Cream butter slightly, add sugar slowly while mixing on second speed. Add the egg yolks, a little at a time. Beat well after each addition. Then add the vanilla.

| | |
|---|---|
| Light brown sugar | 4 lb. |
| Chocolate liquor | 3 lb. 4 oz. |
| Water, hot | 2 lb. |
| Salt | 1 oz. |

Combine brown sugar, chocolate, water and salt. Heat over boiling water until chocolate melts. Stir until sugar is thoroughly dissolved. Whip together thoroughly, and then cool to room temperature (about 80 deg. F.)

Add this slowly to preceding creamed mixture while beating on second speed. Mix smooth to the desired spreading consistency.

Yield ..... 16 lb. 2 oz.

***Production Suggestions***

Heat chocolate mixture over boiling water. *Do not* heat over a direct flame or in oven.

If icing becomes too firm, remix it over boiling water.

Formula from General Foods Sales Co., Inc.

FORMULA NO. 184

## Peanut Brittle No. 3

| | |
|---|---|
| Sugar (white granulated) | 10 lb. |
| Water | 1 qt. |
| Corn sirup | 10 lb. |
| No. 1 Spanish peanuts (raw) | 15 lb. |
| Molasses (yellow) | 1 qt. |
| Salt | 2 tablespoonsful |
| Oil of lemon | 1 tablespoonful |
| Soda (optional) | 1 teaspoonful |

Cook sugar, water and corn sirup in open fire pan with frequent stirring to 230 deg. F. Stir in peanuts and continue cooking until they are well roasted. Then add molasses gradually and with stirring. Cook to 240 deg. F.; add salt; stir well; and pour out on oiled cooling slab. Allow to cool for a few minutes. Add oil of lemon; fold in edges; and work to keep nuts uniformly distributed while mass stiffens. Then roll and stretch into thin sheet. When thoroughly cold, break up and pack.

If soda is added, be careful to stir in quickly and well before pouring mass onto slab. Otherwise batch may boil over.

FORMULA NO. 185

## Braunschweiger No. 1

| | |
|---|---|
| Pork livers | 55 lb. |
| Skinned jowls | 45 lb. |
| Onions | 3 lb. |
| Dry milk solids | 3½ lb. |
| Salt | 3 lb. |
| White pepper | 6 oz. |
| Ground celery seed | 2 oz. |
| Sweet marjoram | 1 oz. |
| Cardamom | 1 oz. |

Slash livers and soak in cold water for 2 hours. It is best to keep them in cooler while soaking. Place livers in silent cutter, add onions and dry milk. Chop fine, then add skinned jowls and spices. Chop all fine. Care must be taken not to get the mixture too warm while chopping.

Stuff in sewed hog bungs. After stuffing cook about 1½ to 2 hours at

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160 deg. F. Chill quickly in ice water. When chilled, hang up to dry, then hang in smokehouse and give as cool a smoke as possible. When the desired color is obtained, take out and cool gradually.

See also General Directions (Formula No. 22).

Formula from Dry Milk Institute

FORMULA NO. 186

## French Pastry Cream
**(Fluff Cream)**

| | |
|---|---|
| 1. Milk, fluid | 4 lb. |
| Sugar (sucrose) | 8 oz. |
| Condensed maple sirup (2½ fold) | 1 lb. |
| 2. Flour, sifted | 5 oz. |
| Egg yolk | 1 lb. |
| Salt | ¼ oz. |

Beat these together and add to (1) while boiling.

| | |
|---|---|
| 3. Egg, white | 1 lb. |
| Sugar (sucrose) XXXX | 8 oz. |

Beat together until stiff.

After (2) has been added to (1) and the mixture cooks thick, stir in (3) before removing from the fire. Use egg whip and stir briskly.

| | |
|---|---|
| Yield | 8 lb. 5 oz. |

Formula from Quebec Maple Sugar Producers.

FORMULA NO. 187

## Tomato Soup

| | |
|---|---|
| Tomato juice (cyclone juice) 150 gal. boiled down to | 100 gal. |
| Onions, peeled, ground | 5 lb. |
| Garlic, peeled, ground | 3 oz. |
| Thyme | 1¼ oz. |
| Bay leaves | 1¼ oz. |
| Summer savory | 1¼ oz. |
| Cayenne | 1¼ oz. |
| Hot paprika | 2 oz. |
| Starch | 15 lb. |
| Milk, fluid | 10 gal. |
| Sugar (sucrose) | 24 lb. |
| Salt | 10 lb. |
| Butter | 10 lb. |
| Yield | 100 gal. |

Formula from Labouche Cheval.
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FORMULA NO. 188

## Imperial Chocolate Icing

| | |
|---|---|
| Fondant | 10 lb. 8 oz. |
| Water | 8 oz. |
| Chocolate liquor | 2 lb. 8 oz. |
| Butter | 1 lb. 8 oz. |
| Vanilla extract | 1 oz. |
| Evaporated milk or simple sirup | To thin |

### *Working Directions*

Place fondant and water in machine bowl and mix smooth. Melt chocolate in a double boiler. Then add to the fondant and mix smooth. Allow to cool. After the fondant and chocolate mixture has cooled to room temperature, add the butter and flavor. Cream light. Use the evaporated milk or simple sirup to thin to the proper spreading consistency.

If a light, fluffy icing is desired, be sure to let the fondant and chocolate mixture cool to room temperature before adding the butter. But if a flat, dark icing is preferred, add the butter while the mixture is still warm so that the butter will melt.

An entirely different result will be obtained if the fondant and water is warmed to 100 deg. F. before adding the chocolate and butter. This gives a smooth, free flowing, high-gloss icing for cup cakes, eclairs, and so forth.

Still another variation can be made by adding 2 lb. of homemade boiled icing (Formula No. 125).

Formula from General Foods Sales Corp.

FORMULA NO. 189

## Pecan Nougats

| | |
|---|---|
| Brown sugar (sifted) | 2 lb. 8 oz. |
| All-purpose vegetable shortening (70 to 75 deg. F.) | 10 oz. |
| Salt | ½ oz. |
| Vanilla extract | ½ oz. |

Cream well, and then add while creaming:

| | |
|---|---|
| Whole eggs | 1 lb. 2 oz. |

Sift the following dry ingredients, then stir into the preceding, and mix until smooth.

| | |
|---|---|
| Bread flour | 1 lb. 9 oz. |
| Baking powder | ½ oz. |

Then add:

| | |
|---|---|
| Pecan pieces (chopped) | 1 lb. |

Place entire batch into a greased and dusted bun pan (18 x 26-in.). Spread out evenly with a bowl knife. Bake *lightly*, 30 to 35 minutes at 380 deg. F. Do not overbake.

When cool, cover with ½ lb. of butterscotch icing, and sprinkle with 3 oz. of chopped pecans. Then cut in oblong shapes 4¼ x 1½ in.

If a plain nougat is desired, brush with a straight egg wash before baking.

Bakes 72 nougats, 4¼ x 1½ in.

Formula adjusted to use of Covo as the shortening.

Formula from Lever Brothers Co.

FORMULA NO. 190

## Chocolate Icing

| | |
|---|---|
| Cream icing stock (Formula 132) | 5 lb. |
| Cocoa | 5 oz. |
| Vanilla extract | to suit |

Cream well.

Formula from American Dry Milk Institute, Inc.


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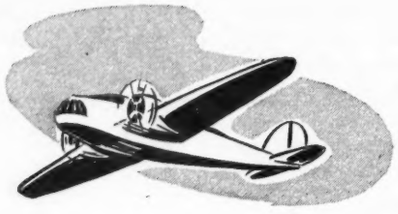

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It is easy to mobilize powdered crystalline thiamin chloride, riboflavin and ascorbic acid, for example, and to incorporate them in many products in such strength that, even if these vitamin substances must themselves undergo bombardment by some processing losses, the final outcome is as though the original raw food never suffered any loss of vitamins $B_1$, $B_2$, or C. The finished products can actually be given greater strength, so great is the mobility of the synthetic vitamins.

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